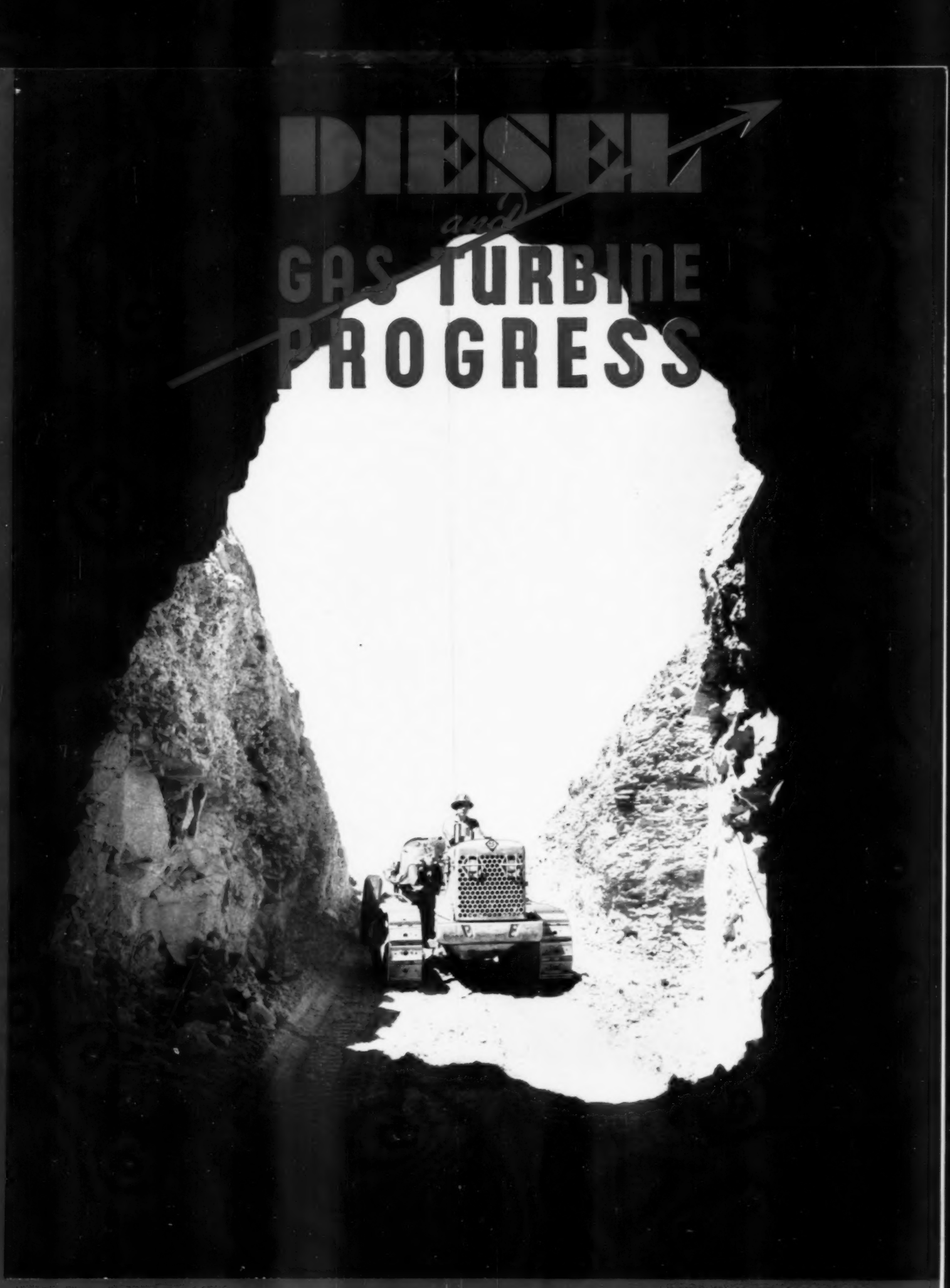
DIESEL and GAS TURBINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



FIVE DOLLARS PER YEAR

FEBRUARY, 1958

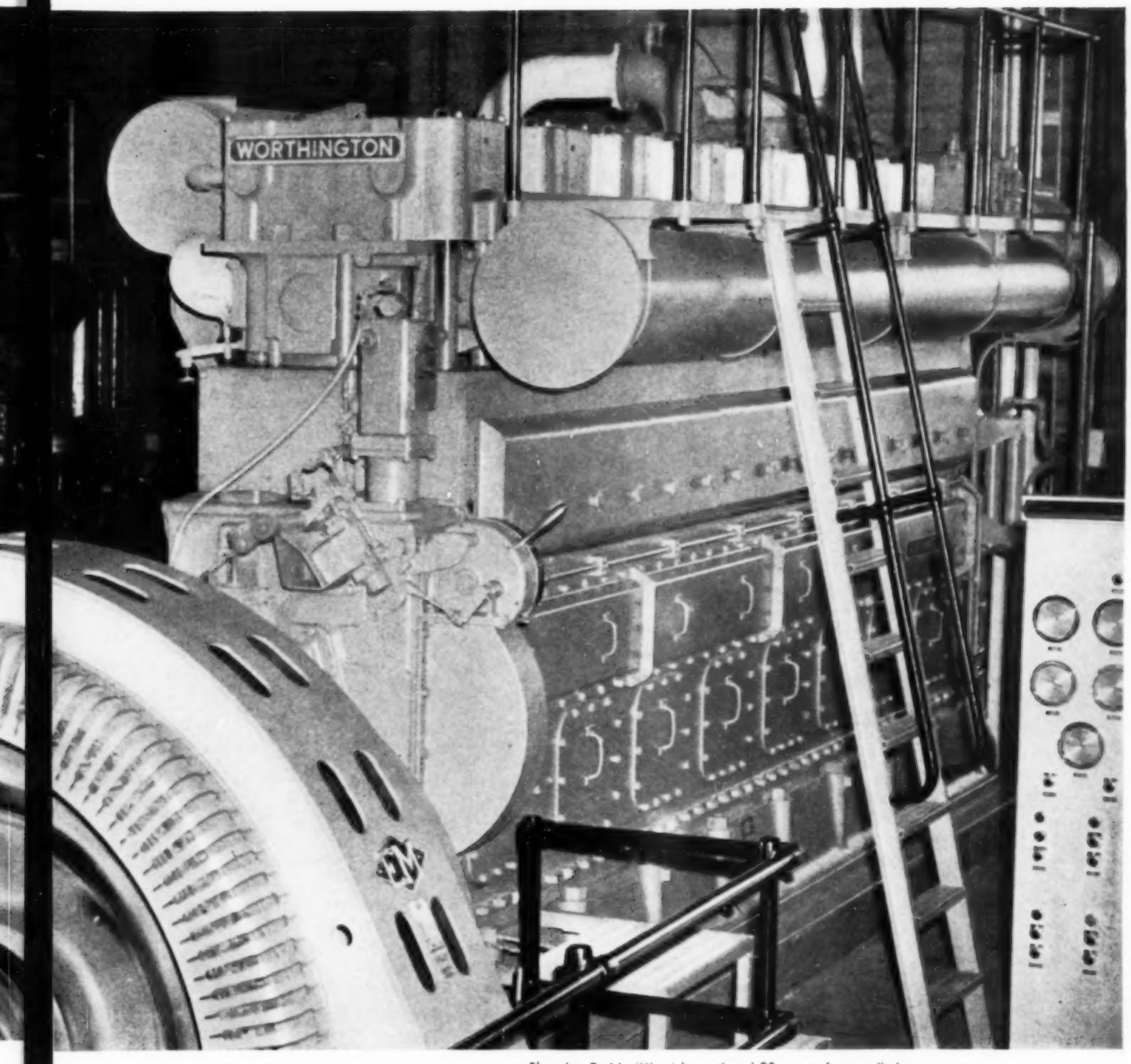
FIFTY CENTS PER COPY

"Texaco Ursa Oil keeps our engines clean. It filters beautifully. We have no lubrication problems." *says Ray Stoltz, Superintendent of Blooming Prairie (Minn.) Municipal Utilities.*

After using Texaco Ursa Oils for twenty-five years, Superintendent Stoltz is so pleased with the results that all competitive attempts to make him change have failed.

Texaco Ursa Oils keep rings free for full-power compression and complete combustion. They resist oxidation—prevent harmful deposits and reduce wear.

And as Superintendent Stoltz points out, "It filters beautifully"—which means it has an extra



Blooming Prairie (Minn.) has enjoyed 25 years of unexcelled service. Its diesels are—and always have been—exclusively Texaco lubricated.

long service life. Just ask any Texaco user, there are plenty around.

For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

Your Texaco representative can show you why. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

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Temperatures made to order for all types of diesel engines. Harrison heat exchangers are rugged, reliable and compact . . . engineered and built to General Motors standards of quality.

Vessel Weathers Grueling Nine-Month Fishing Season With Harrison-Cooled GM Diesel!

The Raider's rugged voyage reaches from the icy waters of Alaska to the sun-drenched regions off San Diego! And Harrison heat exchangers keep engine oil temperatures shipshape for this long haul. Harrison heat transfer equipment provides the optimum in cooling efficiency and economy even under the heaviest loads and continuous operating assignments. That's why you'll find Harrison regulating temperatures in every line of industry and defense. If you have a cooling problem, look to Harrison—with over 47 years' experience in the manufacture of top-quality heat-control products.

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DIESEL and GAS TURBINE PROGRESS

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IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

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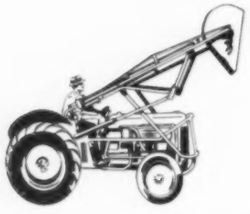
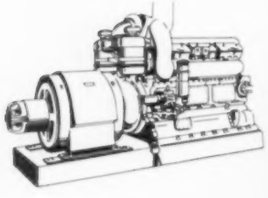
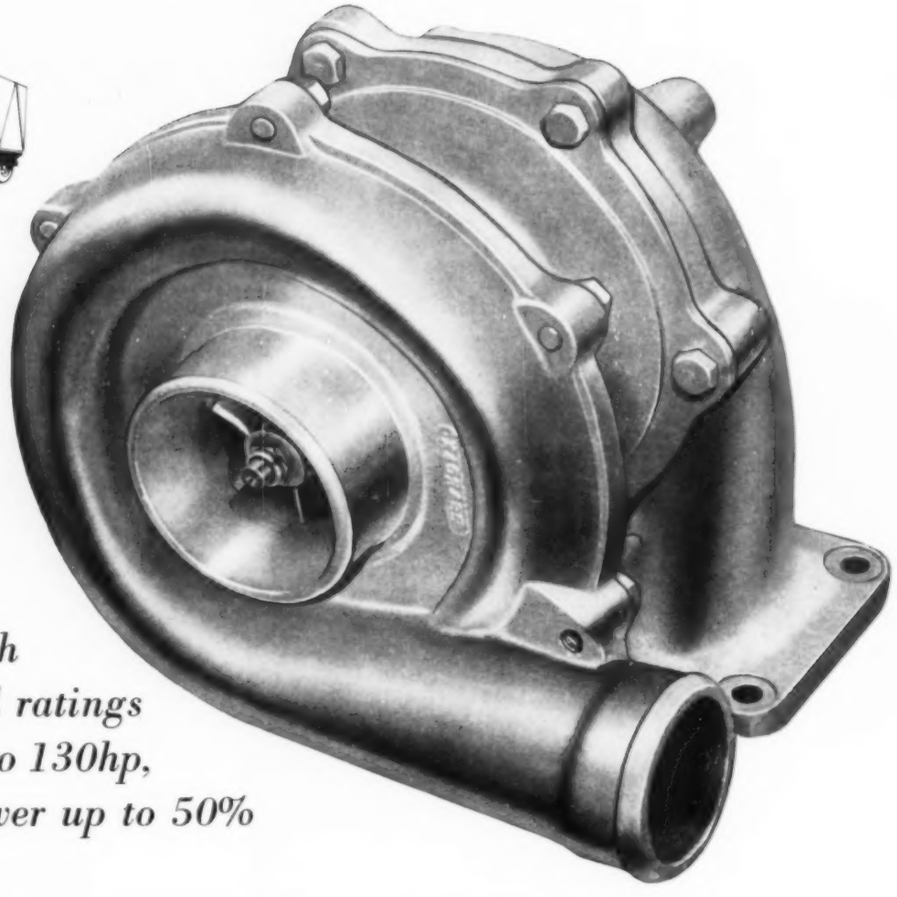
FRONT COVER ILLUSTRATION

An Allis-Chalmers HD-6 crawler tractor towing a rear dump ore cart, descends a 20% grade into the depths of a uranium mine being developed by the Giant Cycle Corporation of Colorado Springs, Colo.

YOUR SMALLER DIESELS CAN BE TURBOCHARGED, TOO ...AT LOW COST!







New AiResearch T-7 turbocharger is designed for diesels with naturally aspirated ratings of from 80hp to 130hp, will increase power up to 50%

A typical AiResearch T-7 installation will give a 900 lb. engine the power of a 1400 lb. engine with greatly reduced specific fuel consumption. It not only increases your payload, but, because it makes your diesel run cooler, it actually extends engine life.

Its low cost, small size, high output and extremely light weight make it the first practical solution to the turbocharging of low horsepower diesels.

Like all AiResearch turbochargers, the T-7 is air-cooled (making no demands on the cooling system of your engine), reduces noise and smoke and maintains sea-level power at high altitudes. Installed on your small diesel, it means smaller initial cost and lower operating costs than those of any naturally aspirated diesel of comparable output.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

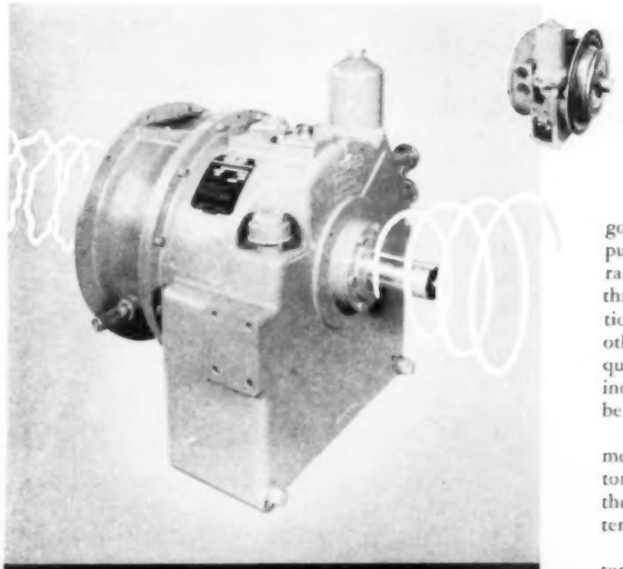
MODEL	T-7	T-10	T-14	T-30
Output — lb/min. (Standard Conditions)	15-30	29-51	30-60	50-100
Diameter — in. nom.	8.5	10.0	11.5	15.1
Length — in.	8.5	10.5	12.9	14.7
Weight — lb.	24.0	40.0	95.0	112.0

THE GARRETT CORPORATION

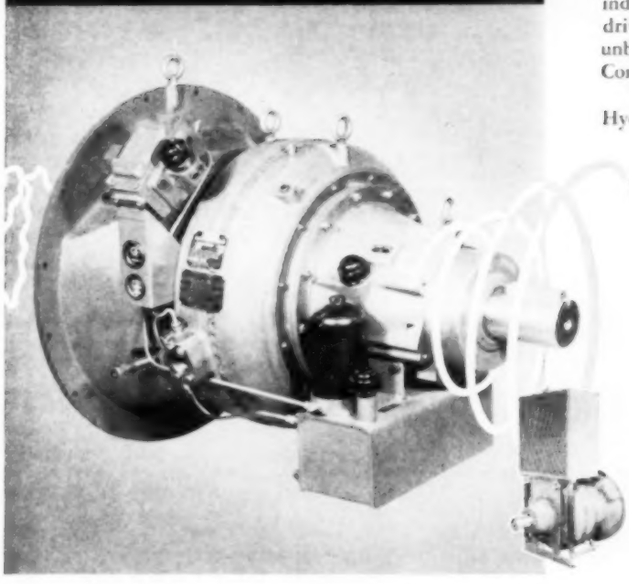
AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS



Single-Stage Torque Converters or Three-Stage Torque Converters?



The answer to the question of "single-stage vs. three-stage" depends largely on the characteristics of the equipment you manufacture or use and the jobs it is required to do. Naturally, many factors must be known before any engineering department can be expected to make recommendations.

Generally speaking, however, when it is desired to have minimum pulldown from governed engine speed—with maximum power output over a wide range—and to produce high torque ratios for hoisting or heavily loaded vehicles, a three-stage torque converter, with torque multiplication up to six times, may be most desirable. On the other hand, where mild torque conversion is required, as in certain types of vehicles and in other industrial equipment—a single-stage converter may be the best choice.

Now you can benefit from the unbiased recommendations of one manufacturer in choosing a torque converter—single-stage or three-stage—with the exact capacity and torque transmission characteristics to give your equipment maximum efficiency.

Twin Disc Clutch Company's line of single-stage torque converters—available as the 1300 and 1500 Series units—complements its time-tested, universally accepted line of five series of three-stage units. Single-stage *or* three-stage—from 30 to 1000 hp—you can depend on Twin Disc Torque Converters to give your equipment better performance . . . less downtime . . . and greater earning potential.

In addition to offering the most complete, the most versatile line of industrial torque converters available, Twin Disc manufactures fluid couplings in a wide range of sizes for engines and motors from ¾ to 850 hp, and friction clutches for applications from fractional to 1050 hp.

For smooth, dependable transmission of power to your equipment and machinery, standardize on Twin Disc—the world's leading manufacturer of industrial fluid and friction drives. Whatever your drive problem, you can count on Twin Disc for unbiased recommendations . . . for Twin Disc Clutch Company makes them all.

Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.

TWIN DISC MAKES THEM ALL

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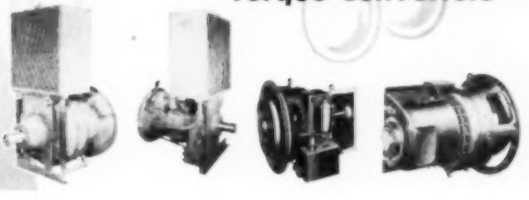
Torque Converters



ENGINEER'S FIELD REPORT

PRODUCT **CHEVRON PRESSURE PRIMER SYSTEM**

FIRM **Bend-Portland Truck Service Portland, Oregon**

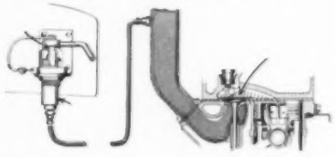
Chevron Starting System cuts starter repairs 75%

Chevron Pressure Primer Systems on Bend-Portland Truck Service's 22 diesel tractors last winter cut starter repairs 75%... reduced battery replacements 25%. "We sometimes towed trucks as long as an hour to get them started in cold weather," says fleet superintendent Ed Gutschmidt, "but we haven't towed one since we installed Chevron Pressure Primer Systems. And our generators and voltage regulators last longer, need fewer repairs and adjustments. Altogether, Chevron Pressure Primer Systems save us many hours a year, and hours are dollars."

Driver Gordon Campbell (above) demonstrates how easy it is to start his Kenworth with a Chevron Pressure Primer Cartridge and the discharger mounted on dashboard. Firm previously tried spray-packs, fluid and ether . . . often needed two men to get truck started. Now one man and a cartridge or two does the job even when its 30° below zero.

Firm's Trucks, all powered with Cummins diesels, range from new to 10 years old. Controlled charge of Chevron Pressure Primer System starts them all safely without knock or ping.

Why Chevron Pressure Primer System assures fast starts



- Volatile Chevron Priming Fuel atomizes in induction system at all temperatures even down to -65°F. No hand-pumping required.
- Pressure or weakest spark from engine fires mixture.
- Simple rugged air-tight discharger prevents Priming Fuel leakage.
- Small, fireproof, pressurized, steel cartridges protect priming fuel from water and dirt.

For More Information or the name of your nearest distributor, write or call any of the companies below.

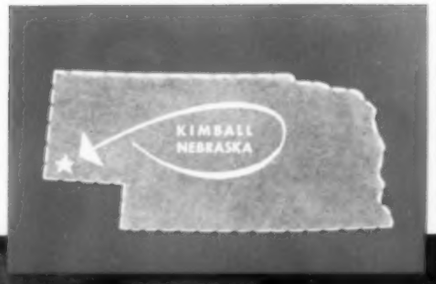
CHEVRON

TRADEMARK "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

Kimball's power plant saves $58,000 yearly!



powered by . . .

SUPERIOR DUAL-FUEL ENGINES

Six years ago, fast-growing Kimball, Nebraska decided to modernize its inadequate power plant. Today, powered by three Superior Dual-Fuel Engines, Kimball's power plant is saving $58,000 a year over private utility rates. The engines operate with natural gas at an average cost of 6.93 mills per KWH. On diesel fuel alone power costs are 10 mills per KWH, and annual savings would be $35,000.

The first engine paid for itself in savings in less than three years! Repeat orders later demonstrated the confidence of Kimball city fathers in Superior engine quality. As a further bonus, the three engines are expected to give good service for 35 to 40 years, according to the town's Public Works Director.

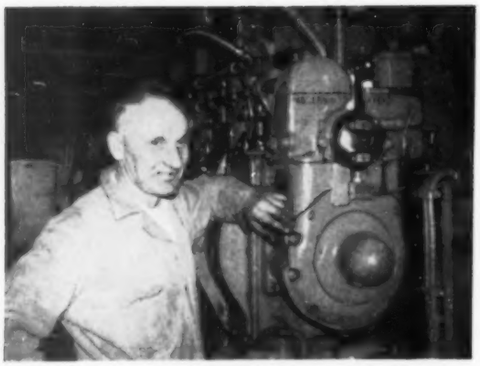
Such *savings, satisfaction* and long-term *service* are characteristic of White's Superior engines. See how you can participate in "Kimball-type" savings. Call or write the nearest office listed below. Let White's engineers discuss the new features of Superior and Atlas engines, ranging from 100 to 2150 H.P., for power to 1500 KW.

White Diesel

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, Ohio

SALES AND SERVICE POINTS: Ketchikan, Alaska ° San Francisco, Terminal Island, California ° Denver, Colorado ° Washington, D. C. ° Clearwater, Florida ° New Orleans, Louisiana ° Boston, Mass. ° Park Rapids, Minnesota ° Webster Groves, Missouri ° Callaway, Nebraska ° New York, New York ° Portland, Astoria, Oregon ° Ft. Worth, Houston, Texas ° Seattle, Wash. ° Halifax, Nova Scotia ° Vancouver, B. C.



Carl A. Hagen, Chief Engineer of the M.V. "Yukon," gives full credit for top towboat performance to his two Enterprise Model DMG-6 Diesels.

The 120' steel-hulled "Yukon" has a beam of 34' and a draft of less than 3½', cruises easily at 12.5 knots towing full load.

Enterprise Engines Rated Tops on Alaska's Rugged Yukon River

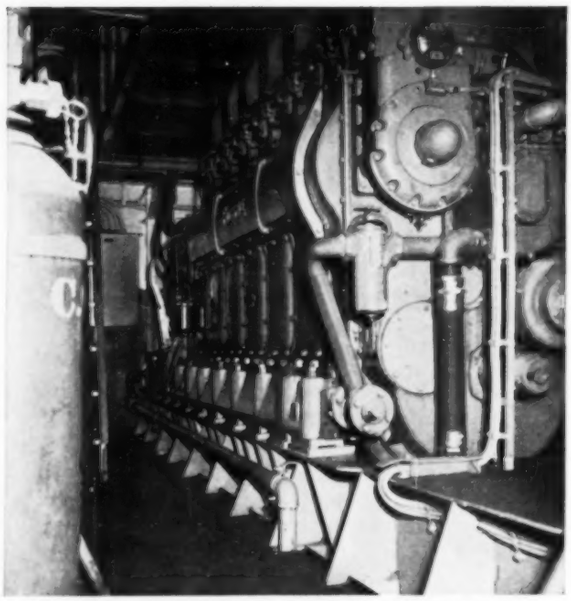
"...towboat 'Yukon' delivers on all counts of engine performance: easy starting, fast response, maneuverability, low maintenance, economical operation, complete dependability."

The tricky Yukon River and its tributaries make a natural proving ground for shallow draft towboats like the M.V. "Yukon." This is grueling work. It demands engine stamina and dependability way beyond "normal." When you cram a year's work into a four months' season, towing 600-ton barges of oil and general cargo, the engines have to be capable of operating 24 hours a day—at maximum load. No trouble or delays.

After logging more than 6,000 hours on each of her 600 HP Enterprise Engines with never an hour lost, Chief Engineer Carl Hagen gives 'em as solid an endorsement as we've ever seen on total engine performance. To sum it up: "Enterprise is the finest engine made." Why not compare for yourself? Information on the complete line of Enterprise Marine Engines, from 73 to 7703 HP is yours for the asking. Or simply call your nearest Enterprise man.

ENTERPRISE
dependable **ENGINES**

ENTERPRISE ENGINE & MACHINERY CO.
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
Export Department, San Francisco



One of the twin hydraulically-controlled 6-cylinder Enterprise 12" bore x 15" stroke Diesels, rated 600 HP at 600 RPM. Owned by the Alaska Railroad, the "Yukon" and Enterprise-powered sister ship "Tanana" are operated by Yutana Barge Lines, Inc.

Boston • Chicago • Des Moines • Jacksonville • Kansas City • Los Angeles • New Orleans • New York • Pittsburgh • San Diego • Seattle • St. Louis • Washington, D. C.

Of course, you recognize this trademark — the trademark of Robert Bosch G.m.b.H., Stuttgart, Germany — pioneer in the diesel injection field. For over 30 years diesel fuel injection equipment bearing this trademark has had no peer for precision, quality, long use dependability.

Now, history is repeating itself. Robert Bosch, pioneer also in the gasoline injection field, has already been building for several years, the same solid reputation for its trademark on gasoline injection equipment.

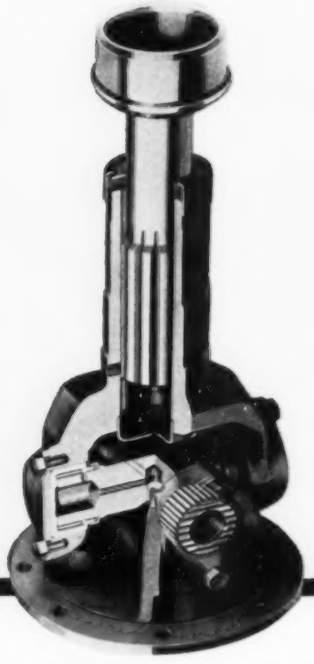
ROBERT BOSCH CORPORATION

40-25 Crescent St., Long Island City 1, N. Y. Branch: 225 Seventh St., San Francisco 3, Cal.

*Registered U. S. Pat. Office, Robert Bosch G.M.B.H., Manufacturers of Robert Bosch Products

The man with the rig that racks up the dough says:

"I like TOUGH joints ...I like Spicer!"



For over 53 years, Spicer has been the recognized leader in the development and production of universal joints and drive shafts.

For sheer guts and brute stamina, Spicer Joints and Drive Shafts are preferred for the toughest jobs the world over.

These are the features that make Spicer Joints so outstanding in service:

- **Sliding splines have ground finish on ALL contact surfaces, and have extra hardness and iron manganese phosphate coating.**
- **True bearing alignment with rigid one-piece yoke design. This rigidity is the essence of accuracy.**
- **Precision bearings with improved surface hardness and finish.**
- **Dynamically balanced to minimize vibration.**
- **Uniform high quality propeller shaft tubing. Steel made to our exacting specifications.**
- **Wide selection of flange and yoke types and sizes to suit each individual requirement.**

Ask Dana engineers, your truck dealer, or truck equipment engineer to show you physical proof of Spicer Universal Joint superiority.

DANA CORPORATION
Toledo 1, Ohio

DANA
Spicer

DANA PRODUCTS Serve Many Fields

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Power-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

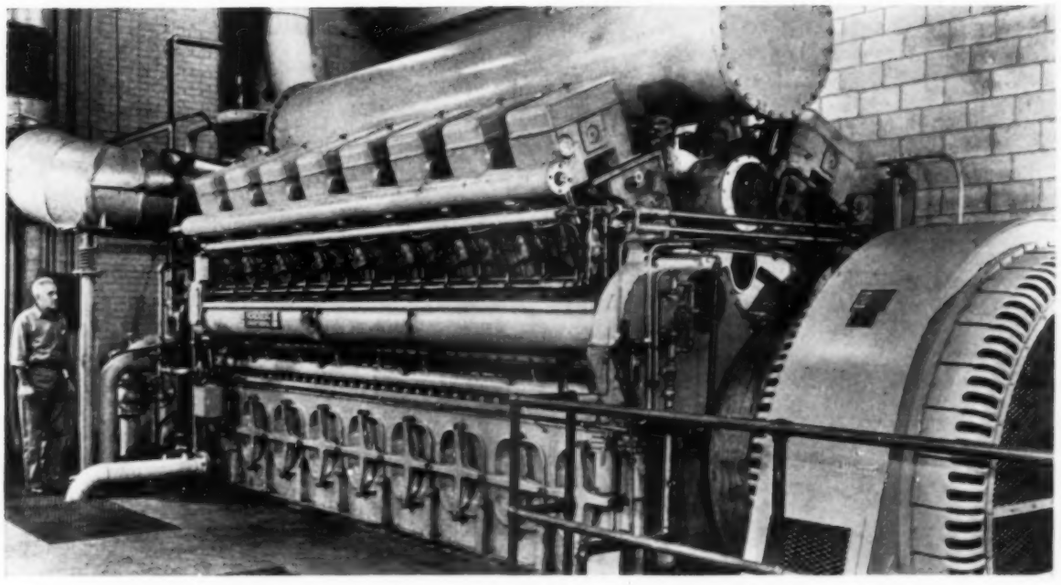
AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

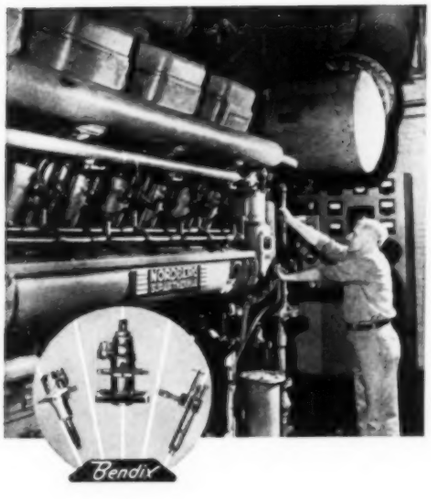
MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

MANY OF THESE PRODUCTS MANUFACTURED IN CANADA BY HAYES STEEL PRODUCTS LIMITED, MERRITTON, ONTARIO



Woodstock, Illinois, keeps power flowing with

NORDBERG DUAFUEL® ENGINE EQUIPPED WITH BENDIX FUEL INJECTION



With a completely independent electric power system, the town of Woodstock, Illinois, takes no chances on power failures. That's why the city fathers recently purchased a Nordberg Supairthermal® Duafuel engine to supplement existing steam turbine equipment. The engine, like many built by Nordberg, is equipped with Bendix* Fuel Injection pumps.

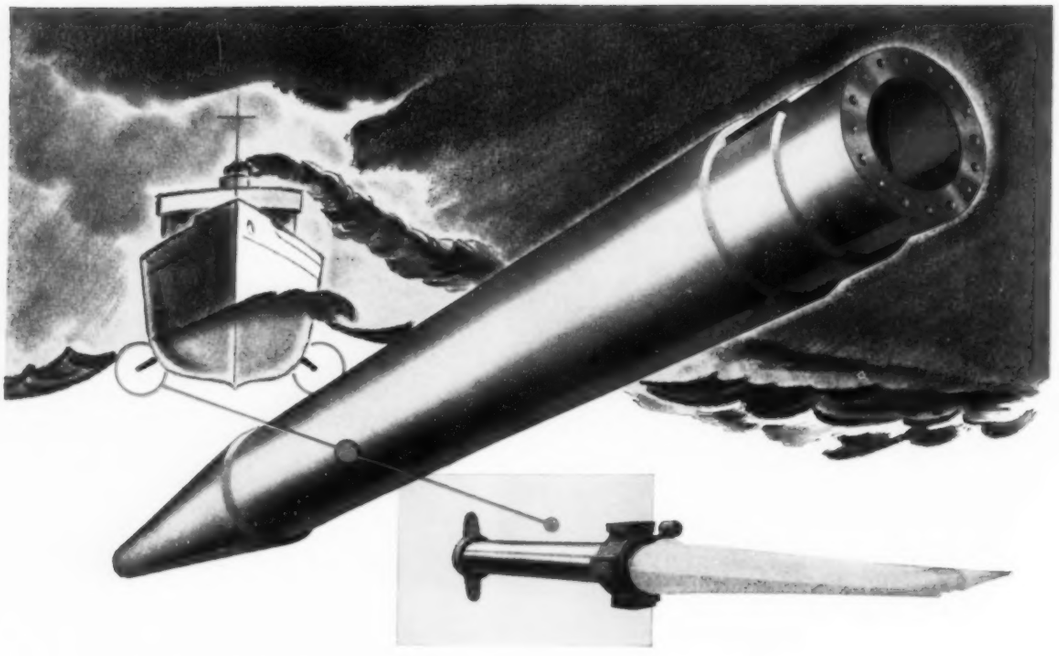
Originally intended as a stand-by unit, the Nordberg engine has more than fulfilled its purpose. So efficient has it proved that it has frequently been used as a base load unit. Far from being relegated to emergency use only, it has seen more and more regular service, and its moderate fuel consumption makes it the most economical unit in the plant, especially for short peaking purposes.

Citizens of Woodstock are happy with their independent power system. They like the revenue it brings in to support their city government (revenue that the new Bendix-equipped Nordberg engine is helping to increase), and, more than that, they like the uninterrupted service, regardless of weather. Bendix is pleased that its fuel injection system used on the Nordberg engine is helping keep this progressive Illinois city supplied with dependable power at reasonable prices. *REG. U.S. PAT. OFF.

SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N. Y.
Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N.Y.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION



35,000 Pounds of Forged Steel . . .
"Giant Muscle" to Fight the Sea

Counter punching against the buffeting of heavy seas requires the sturdiest kind of stabilizing mechanisms on modern naval and merchant ships. Hence, the use of the forged steel shaft which controls the stabilizer fins in the assembly shown above.

Forged and machined to 35,000 pounds, this steel shaft is 29 feet 8 inches long. Body diameter is 25¾ inches and the shaft is bored and honed to 14 inch diameter 17½ feet in from the flange end.

Bearing the brunt of storms at sea, this "giant muscle" is at the heart of modern stabilizers in ships of widely diverse tonnage plying the seven seas today. Another example of the versatile capabilities available at Erie Forge & Steel. Strict quality control from raw materials to finished steel forgings and castings within our own plants are yours here "Under One Responsibility and One Control". Your nearest field sales engineer will be in very soon to discuss your requirements with you.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

MEMBER AMERICAN IRON AND STEEL INSTITUTE

ERIE FORGE & STEEL CORPORATION

Maybe *you'll soon have this decision to make*

LUBRICATION CASE STORY ON THE NEW WORTHINGTON AT INDEPENDENCE, IOWA

Situation: Gene Williamson, plant superintendent, had a decision to make when the Independence, Iowa, Municipal Light Plant installed a new 3600 Horsepower Dual-Fuel Worthington last year. What lubricating oil to use? Other equipment in the plant was lubricated with STANODIESEL Oil M. Performance was excellent. Lubrication technical service performed by men with experience and training for the job likewise was excellent.

What was done: The decision was made to install STANODIESEL Oil M. Now after 3,780 hours of operation, there are no regrets. There are no signs of wear.

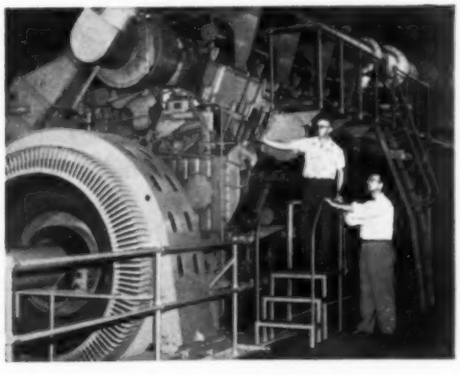
STANODIESEL Oil M is refined from the finest-quality base stock. Additives help the oil resist viscosity change, keep engine parts clean. Other additives control foam, make it possible for oil to reach and hold protective film on even the most difficult to lubricate parts.

What you can do: Get all the facts about STANODIESEL Oil M from your Standard Oil lubrication specialist. There's one near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.**

Quick facts about
STANODIESEL OIL M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult to lubricate parts.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

You expect more from **STANDARD** *and get it!*



Running smoothly. Gene Williamson, power plant superintendent, and Standard Oil's Bob Wenger (right) check over new Worthington Dual-Fuel engine. Good lubrication technical service is one of the reasons Williamson decided upon STANODIESEL Oil M when engine was installed. Bob Wenger is well qualified by both experience and training to provide such technical service. He has been doing this work for nine years. In addition, he has an engineering degree from Iowa State and has completed the Standard Oil Sales Engineering School.

Michigan-Ohio News

By Jim Brown

KENNETH Routheaux of St. Louis, Michigan has accepted delivery on an Allis Chalmers model HD11B (11-ton) crawler tractor with hydraulic bulldozer blade. The tractor was sold by Earle Equipment Co. of Detroit.

TEN Cummins model JT-6-B Turbodiesel engines have been sold to Interstate Truck Service, Inc. of Martin's Ferry, Ohio. The engines will be used in GMC model 662 tractors and were sold by Cummins Diesel of Northern Ohio, Inc.

R. G. MOELLER Co. of Detroit has delivered a 1¼-yard Lorain model L-56 backhoe powered by a GM 4-71 Detroit Diesel engine to Volpe Excavating Company of Detroit.

CYRIL J. Burke, Inc. of Detroit has recently delivered an Oliver Super 88 Hydro-Trencher to the City of Warren, Michigan. The Oliver trencher is completely hydraulic in operation, equipped with a ½-yd bucket and powered by a 55 hp. 6-cylinder Hercules diesel.

ALFRED Nordstrand of Alpena, Michigan has purchased a Cummins model HRC-4-M diesel from Cummins Diesel Michigan, Inc. of Detroit. The new diesel will be installed in his boat, the 36 ft *Leon J.* Reverse gears are Twin Disc with a 2 to 1 ratio.

MROCZEK Brothers of Decatur, Michigan have accepted delivery on an Allis Chalmers model HD11B crawler tractor. The sale was made by Earle Equipment Co. of Detroit.

THE Grand Rapids branch of Wolverine Tractor & Equipment Company has delivered an International model TD-9 crawler tractor to Mr. Ed O'Brian of Benton Harbor, Michigan.

RAY C. Call, Inc. of Steubenville, Ohio has sold a model 6030-C GM Detroit Diesel generator set (100 kw) to George Troy Lee & Sue Red Ash Coal Company of Iaeger, W. Va.

A MODEL 6 Northwest (1¾-yd) powered by a model 20 Murphy diesel has been delivered by Cyril J. Burke, Inc. of Detroit to A. Bruce & Sons of Livonia, Michigan.

NATIONAL Gypsum Co. of National City, Michigan has purchased a model NHS-6-BI Cummins diesel to install in their Euclid off-highway rear dump. The new Cummins was sold by Cummins Diesel Michigan Inc. of Detroit, and will be broken in on quarry work.

HARRY W. Stoddard, who has been Detroit sales manager of Wolverine Tractor & Equipment Co., has been elected a vice president of the organization, according to Tom McNutt, president. Mr. Stoddard is one of the original members of the Wolverine Tractor organization, having been with them in a sales capacity in the Detroit area since 1943.

TELFORD Equipment Co., Inc. of Detroit has delivered a model C LeTourneau-Westinghouse Tournatractor to Loselle Construction Co. of Wyandotte, Michigan. The Tournatractor is powered by a GM 6-71 Detroit diesel and was broken in on a construction project between Brighton and Farmington, Mich.

SUB-TERRANE Construction Co. of Oak Park, Michigan has accepted delivery on an Allis Chalmers model HD-6B crawler tractor equipped with hydraulic bulldozer. The sale was made by Earle Equipment Company of Detroit.

DANIEL Hampton of Canton, Ohio has a new Cummins model JT-6-B (175 hp)

Ten AAF Cycoils deliver *clean* air to the 660 hp. engines driving pumps at the Ward-Estes Water Flood Project.

CYCOIL air is dust-free air

AAF Cycoils protect engines—require minimum maintenance

When engines are driving pumps for high-volume water injection used in secondary recovery, down-time means decreased production. That's why only the best protection against dust and dirt is good enough. At the Ward-Estes Water Flood Project, Ward County, Texas, ten AAF Cycoils do the job.

AAF Cycoil oil bath air cleaners require an absolute minimum of maintenance. It is not necessary to tear them down for cleaning. Due to self-cleaning action of the filter pads, the only maintenance needed is the periodic replacement of oil. Records show that Cycoils have been on the job in some applications for as long as 20-years without being dismantled for maintenance.

Cycoils offer many advantages—uniform air delivery, constant efficiency, low operation resistance, minimum maintenance. Get all the facts on AAF Cycoil oil bath air cleaner right away. Write today for Bulletin 130.

Type CMS Multi-Duty Filters
Type G Pipeline Air Filters
BETTER AIR IS OUR BUSINESS
Type OCH Intake Air Filters
Cycoil Oil Bath Air Filters

AAF American Air Filter COMPANY, INC.
408 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

for his Mack LF tractor. The new Cummins diesel was delivered by Cummins Diesel of Northern Ohio, Inc.

H & H Construction Company of Dearborn, Michigan has a new model 4150 GM Detroit Diesel generator set (80 kw —intermittent) to power their Butler batch plant. The generator set was purchased from Peninsular Diesel of Detroit.

BLUE Water Excavating Co. of Port Huron, Michigan has purchased a model HD16AC Allis Chalmers crawler tractor from Earle Equipment of Detroit. The new tractor is equipped with a cable bulldozer and cable control unit.

Cummins Diesel Sales Corp. of Cincinnati, Ohio has delivered a model HR-6-IP 175 hp Cummins diesel to Grund, Inc., of Hamilton, Ohio. Application is on an Ohio Locomotive Crane.

AN Austin-Western model 88L grader powered by a GM 3-71 Detroit diesel was recently sold by the R. G. Moeller Co. of Detroit to the City of Alpena, Michigan.

FISHER Contracting Co. of Midland, Michigan has accepted delivery on a model HD11B Allis Chalmers crawler tractor from Earle Equipment Co. of Detroit.

NEW Port Coal Co. of Strasburg, Ohio has purchased a model LI-600 Cummins diesel for installation in their model 1201 Lima shovel. Sale was made by Cummins Diesel of Northern Ohio, located in New Philadelphia, Ohio.

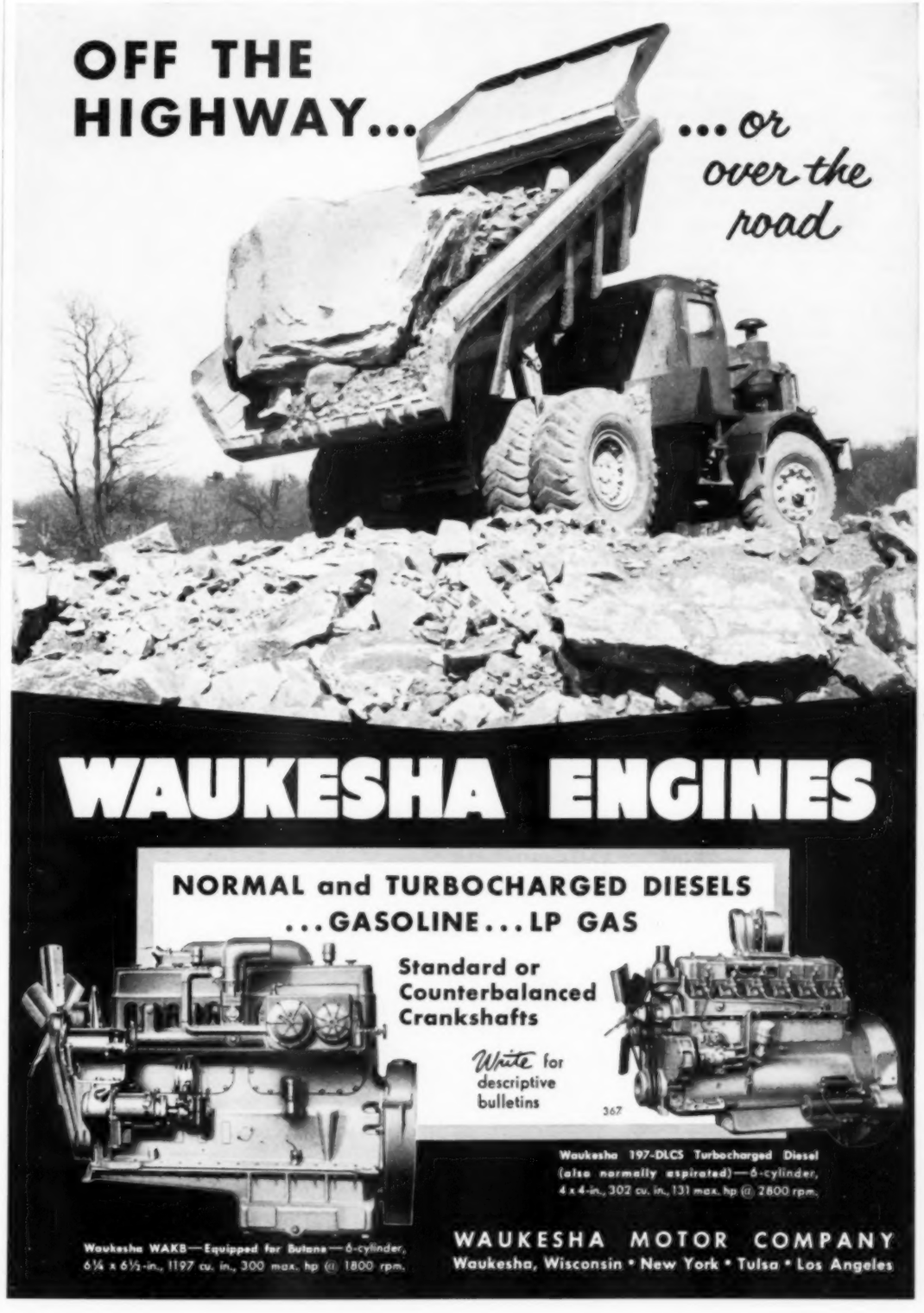
Releases General Catalog

A new General Catalog of the Cuno Engineering Corporation on its complete line of filters and strainers for fluids and gases is now available. Specifications, performance characteristics and application data on Cuno's Auto-Klean, Super Auto-Klean and Flo-Klean edge-type filters, Micro-Klean fiber cartridge-type filters, Poro-Klean porous metal filters, and Micro-Screen screen-mesh filters, are presented to facilitate selection and use. The diagrams, charts and illustrations featured throughout contribute to making it a comprehensive reference catalog on industrial filters and filtration. The catalog is numbered 58-100 and can be obtained from The Cuno Engineering Corporation, So. Vine Street, Meriden, Conn. (ITS NEW)

Exhibitors For OGP Meeting

As we went to press for the February issue, the following companies had reserved exhibit space at the Oil and Gas Power Division of the ASME Meeting to be held at the Bellevue-Stratford Hotel, Philadelphia from May 12 through 15: Van Der Horst Co., Socony Mobil Oil Co., Kistler Instrument Corp., Burgess Manning Co., Illinois Testing Laboratories, Johnson Bronze Co., Wilkening Mfg. Co., International Nickel Co., Scintilla Division–Bendix Aviation Corp., Harper Packing Co., Nordberg Mfg. Co., Diamond Chain Co., Fairbanks, Morse and Co., Cleveland Graphite Bronze Co., Woodward Governor Co., American Air Filter Co., D. Napier and Son, Ltd., Curtiss Wright Corp.—Massey Machine Div., Koppers Co., Inc. —Metal Products Div., Wm. W. Nugent and Co., Commercial Filters Corp., and American Bosch Div.

There are only a few exhibit spaces left, so if you want to exhibit at this important Meeting contact the Exhibits Chairman, John E. Onnen, Koppers Co., 122 S. Michigan Ave., Chicago 3, Ill. right away. This is the only Meeting where you will find concentrated so many buying influences amongst engine manufacturers as well as users of engines in every major industry where diesels find application.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NORMAL and TURBOCHARGED DIESELS
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Standard or Counterbalanced Crankshafts
Write for descriptive bulletins
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Waukesha 197-DLCS Turbocharged Diesel (also normally aspirated)—6-cylinder, 4 x 4-in., 302 cu. in., 131 max. hp @ 2800 rpm.
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WAUKESHA MOTOR COMPANY
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Florida Diesel News

By **Ed Dennis**

FOR THE Cuban-American Nickel Co., in Cuba, an Oshkosh 28 cu yd dump truck, powered with a model NHRBS Cummins diesel engine rated 300 hp at 2100 rpm. It has an Allison TG602 planetary transmission and torque converter.

DOWN at Key West, Thompson Enterprises, took delivery of a model JBS Cummins with a hp of 150 at 2500 rpm; Capitol hydraulic r&r gears are 2:1, and installation is on a fishing craft.

AMERICAN MARC will feature a diesel outboard engine at the Miami Motor Boat Show in February at the Dinner Key Auditorium. This will be the second public showing of this new diesel, the first being at the New York show.

CUMMINS Diesel Engines of Florida repowered a Galion road roller with a 4 cyl model JHBI Cummins diesel. It develops a hp rating of 70; it is for R. H. Wright & Sons of Fort Lauderdale.

THE *Coral Reef*, a 72 footer, was the first trawler launched at the new yard of General Marine Boat Yard Inc., Fort Myers Beach. The D342 Caterpillar turns a 50x34 four blade Columbian propeller through 3:1 Snow Nabstedt r&r gears. The Cat develops 152 hp at 1200 rpm. A Lister Blackstone diesel auxiliary unit was also included.

AT PIER #3, Miami, the sewerage pumping station is now operating at full capacity; three model 38F5¼ Fairbanks-Morse diesels develop 450 hp at 1200 rpm, each drive a 20 in. 10,000 gpm Fairbanks-Morse pump. Four Air Maze oil bath air filters are used on each engine.

DELIVERED to Puerto Cortez, Honduras, for the Foster-Williams Bros. Co., one #977 Caterpillar Traxcavator with a 2 cu yd bucket and one Bucyrus-Erie, model 38B, dragline powered with a D342 Cat diesel. These are to be used in the construction of the Pan American Highway.

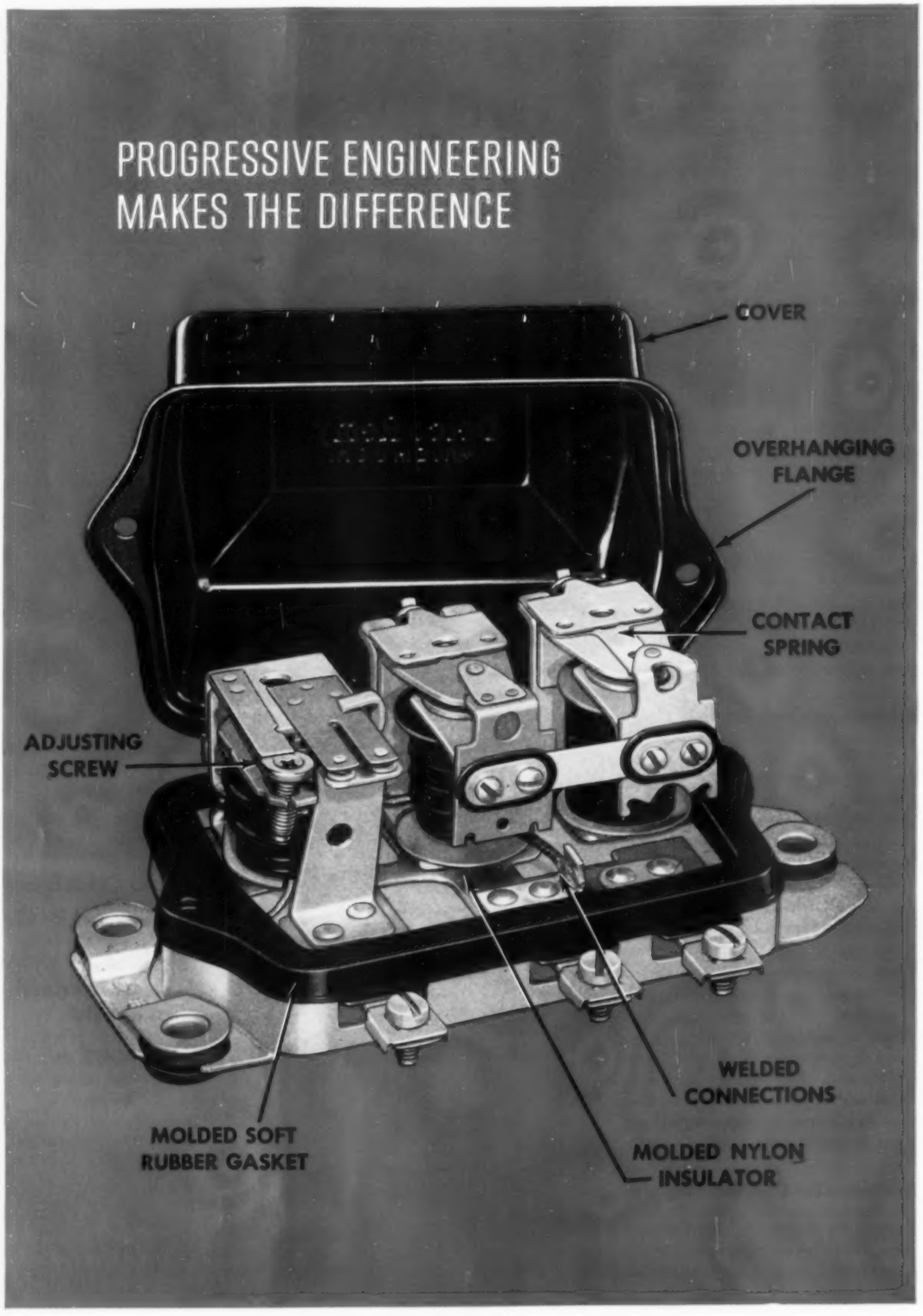
TWO 62 ft fishing trawlers were launched, at Diesel Engine Sales, St. Augustine, powered with General Motors 6-71 diesels. The engines were equipped with GM power take-off and 4.5:1 hydraulic r&r gears which turn 46 x36 four blade Federal propellers.

FLORIDA Georgia Tractor Co. recently delivered HOD Payloader tractor-shovels to Jack Yellowton of Fort Lauderdale and R. J. Inlands of Miami Beach. These machines are powered with Cummins JN6BI diesels and rated 122 hp at 2200 rpm with Allison 3.5:1 torque converter.

VENEZUELA bound, three 1000 kw skid mounted mobile Superior dieselized generating sets. The Ideal electric generators are powered by model 6SSX6 Superior diesel engines each rated 1600 hp at 600 rpm having a bore and stroke of 12¾x15. Each package unit is weather proof, mounted on a low bed trailer and can be snaked off if necessary.

THE *Candie Kidd*, a drift party fishing craft, of Hillsboro Beach, was repowered with two General Motors 4 cyl 71 series diesels. Installation also included GM 1.5:1 hydraulic r&r gears. Ellis Diesel Sales & Service, Fort Lauderdale, did this fine installation.

CUMMINS Diesel Engines of Florida, Coral Gables, sold a model JNS-6-B Cummins diesel engine, rated 165 hp at 2500 rpm, to supply power for drill operation and motive power in a Schramm rig drill. The machine is used for dynamiting rock by the Oolite Crush Stone outfit in South Miami.



THE second #4500 Manitowoc speed crane was shipped via West India Shipping Co. to Moa Bay Mining Company, Cuba. Weighing 196 tons and valued at $200,000., it is believed to be the largest single piece of heavy equipment shipped from the United States via a motor vessel. It is powered with a Cummins VT12-1 turbocharged diesel engine. Also included is a Gardner-Denver air compressor and a 5 kva air cooled Onan diesel generating set for night operations.

THE *Scalawag* of Fort Myers Beach and the *Louise I.* of Miami are standard 67 ft Campeche trawlers recently launched at Diesel Engine Sales, St. Augustine. Both were completely equipped for the long trip across the Gulf plus 4-5 weeks of shrimping. Gibbs Corp. of Jacksonville supplied the D342 Caterpillar 210 hp diesel engines with 3:1 Snow-Nabstedt r&r gears. Twin Disc power take-offs which turn 50x34 Four blade Federal propellers and 1500 watt Petter diesel auxiliary units.

AT CHRIS Boat Works, on the Miami River, two twin screw vessels will be powered with General Motors 6-71 diesel engines. The 85 footer will have 2.04:1 Twin Disc r&r gears and the 54 ft craft will have 1.5:1 GM hydraulic r&r gears. Both are party fishing vessels.

AWAITING shipment to the Bahama Tractor & Equipment Ltd., Nassau, are three D8 Caterpillar tractors with dozer blades plus four #12 road graders and one #977 Traxcavator to be used on construction jobs in the Bahama Islands.

REPOWERED with an Allis-Chalmers model 6DAS-MR-844 marine diesel engine, the Grimes Corp. dredge at Del Ray Beach, can now suck almost twice as much sand as before and discharge it 1200 feet to shore, with the same 8 in. Maddox pump. This is the new 5¼x 6½ supercharged Buda Div. diesel engine; engineering and installation was by J. Frank Knorr Co., Miami.

THE 26 cu yd Mack dump truck shipped via the *MV Inagua Arrow* to the Freeport Sulphur Co., Cuba, is powered with an NHRIS 6 cyl Cummins diesel engine which is rated 300 hp at 2100 rpm and an Allison torque converter. This 10 wheel job weighs 65450 lbs and will be used in the open pit mines.

RECENT additions to the Cummins dieselized hiway tractor trailer fleet included a model NHB 600 rated 210 hp at 2100 rpm for J. M. Burgess of Jacksonville, for a Mack and the Orange State Motors of Tampa had a 165 hp model HRB 600 with a Fuller roadranger transmission installed in an International Harvester DCO tractor.

REA Conference

The 9th Annual REA Electric Generating Plant Operation and Maintenance Conference will be held at the Phoenix Hotel, Lexington, Kentucky, from April 7 through April 10, 1958. Sessions on steam and diesel plant operation and maintenance will be held either jointly or separately, depending on the topics of the meetings, as has been done in past conferences.

The Conference committee has asked us to make it understood that this conference is not restricted to REA Cooperatives entirely, but a cordial invitation is extended to any municipality or utility that desires to send a delegate. A five dollar registration fee is all that is required. This annual REA Meeting always has topics of great interest to diesel plant operators on its program, and the contacts with other operators from all over the country are invaluable to those who attend the convention.

For additional information contact E. H. Holwick, 311 West Lexington Ave., Winchester, Kentucky.

DELCO-REMY WATERPROOF STANDARD REGULATORS IMPROVE FLEET PERFORMANCE

Better electrical performance and greater dependability in any weather are important benefits to fleet operators found in Delco-Remy's waterproof standard generator regulators, now available for general replacement use.

And here are the features that make them the *right* regulators for Delco-Remy equipped cars and trucks in fleet operations.

1. New overhanging one-piece formed-steel cover and mating base shed road splash . . . convenient attaching screws are *outside* the enclosed area. Molded soft rubber gasket seals out harmful oil and water vapors.
2. Integral sleeves of molded nylon insulator form permanent seal around rivets—assure watertight base.
3. New, longer, more flexible armature contact spring on voltage regulator unit assures more positive closing of contact points for smoother operation.
4. Welded electrical connections, and highest quality tungsten and non-tarnishing precious metal contact points, assure minimum resistance, maximum durability.
5. Special fine thread screw-type controls allow easy, highly accurate adjustment of all three units.

Always replace with Delco-Remy waterproof regulators when you service Delco-Remy equipped cars and trucks. These improved regulators, built to highest quality standards by the original equipment manufacturer, are available from your car or truck dealer or the United Motors System.

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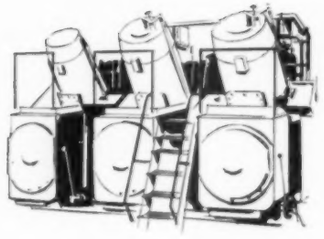
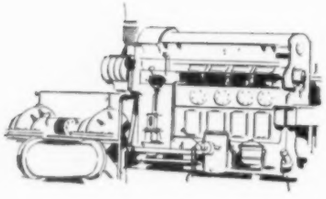
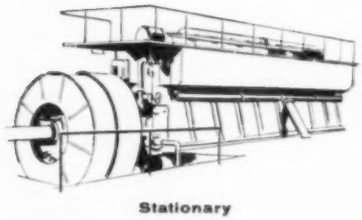


Engine compressor



Pumping



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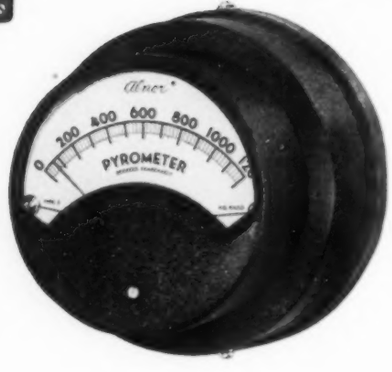

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MARINE APPLICATIONS OF GAS TURBINES AND FREE PISTON-GAS TURBINES IN TWO PARTS—PART I

By JOHN W. SAWYER*
and
G. L. GRAVES, JR.**

THE newcomer in the marine prime mover field, the gas turbine, can now celebrate its tenth birthday. On July 14, 1947 the first boat powered with a gas turbine went to sea. This was the British MGB 2009. The gas turbine was the Gatric engine, rated at 2500 hp. In 1957, just ten years after, the total power, including gas turbine and free piston-gas turbine engines for propulsion and auxiliaries now in operation or building, is approximately 261,000 hp (see Table 1). This includes 206,000 hp for propulsion and 55,000 hp for auxiliary power. The total gas turbine power is 163,000 and the free piston-gas turbine 98,000 hp. A total of 274 ships are involved. Some 239 have the gas turbine for propulsion, auxiliary or both and 35 ships have free piston-gas turbine plants. It is interesting to note that naval applications have 135,000 hp and merchant ships 27,000 hp of gas turbines. The free piston-gas turbine in naval service totals 37,000 hp and 60,000 hp in merchant use. One of the early barriers, that of reversing or astern power, seems to be of no great concern to-day. It is evident that astern power is obtained through controllable propellers, reverse gears and reversing turbines. These methods are found in plants varying from 160 to 10,000 shp. The development of engines with improved components, reliability and efficiency, is continuing in many areas. Sea experience with the engines is showing the way for even further improvements. As the engines are improved, based on the sea time and laboratory developments where mechanical design, materials and aerodynamic qualities are bettered, the marine applications will accelerate at an even more rapid pace.

Merchant Applications

In naval application the military characteristics of a ship are of prime importance, however economic considerations dominate merchant applications. In different countries the choice of ship powerplants reflect prevailing interest rates on investments, labor rates and fuel costs. The future of the gas turbine should not be predicated on the possibilities of burning a cheaper fuel than other plants. Steam boilers, free pistons and low rpm diesels can satisfactorily burn low grade fuels. Gas turbines have been able to burn residual fuels only when the fuel characteristics are within certain limits or the turbine inlet temperatures are below 1200° F. For temperatures greater than 1200° F. the most successful method used to control fuel ash corrosion consists of water washing the fuel and use of a fuel additive. Since ship building costs are tending to increase, availability of the ship investment to earn money is becoming more and more important. In addition to plant reliability, the ease of overhaul and down time for overhauls, initial costs, maintenance and operating requirements are major factors. Whereas these things are rather difficult to evaluate at this time some limited experience is available.

The Shell tanker *Auris* was the first merchant ship to be propelled by a gas turbine. Under normal conditions three diesel alternators and a 1200 hp gas turbine alternator set operated in parallel to supply current to the single propulsion motor. After 17,510 hours of operation on the gas turbine it was decided that the reliability, low maintenance and down time of the gas turbine warranted replacement of this combined plant with a single gas turbine of 5500 hp; see Fig. 1. Power will be transmitted through articulated double reduction gearing in conjunction with a hydraulic maneuvering system. A flexible coupling will connect the turbine output with a quill shaft which will be keyed to the driving wheels of the ahead hydraulic coupling and the astern torque converter. Cargo pumping will be accomplished by a 550 kw alternator connected to the main gear box through a third fluid coupling. Auxiliary power for the *Auris* will be provided by a 200 kw steam turbo alternator set which will take steam from a waste heat boiler in the gas turbine exhaust. As a standby a 120 kw gas turbine driven alternator set will be installed for emergency purposes.

To offset improved undersea warfare techniques cargo carriers with increased speed are essential to meet national defense needs. As part of a program to evaluate new machinery in the standard steam engine equipped Liberty ship, the U. S. Maritime Administration has proceeded with a gas turbine and also a free piston plant installation. Since conversion costs were kept to a minimum, new ship designs employing these plants would be somewhat different. The *John Sergeant* was repowered with an industrial type gas turbine, see Fig. 2. The gas turbine employed has already demonstrated in land applications that maintenance and operating costs will be low. Under full speed conditions a speed of 18 knots was obtained while .51 lbs of fuel per shaft horsepower hour were consumed. The *John Sergeant* is the first merchant ship propelled exclusively by gas turbines to go into regular trans Atlantic service. The power turbine rotor of the *John Sergeant* gas turbine plant is connected to a controllable and reversible pitch propeller through a flexible coup-

Fig. 4—Boeing Gas Turbines are installed in this Creole Petroleum Company personnel high speed boat.

*Head Civilian, Gas Turbine Branch, Bureau of Ships, Navy Department, Washington 25, D.C.
**Head, Auxiliary Section of Gas Turbine Branch, Bureau of Ships, Navy Department, Washington 25, D.C.

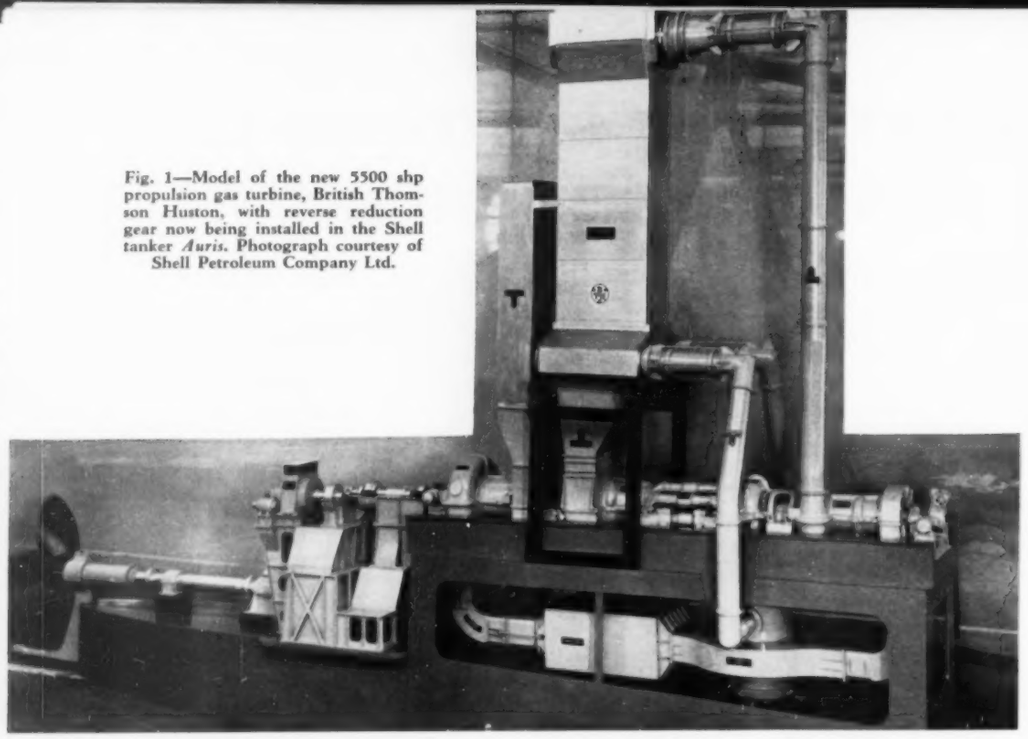


Fig. 1—Model of the new 5500 shp propulsion gas turbine, British Thomson Huston, with reverse reduction gear now being installed in the Shell tanker *Auris*. Photograph courtesy of Shell Petroleum Company Ltd.

Fig. 2—General Electric Company gas turbine, propulsion, being installed in the U. S. Maritime Ship *John Sergeant*.

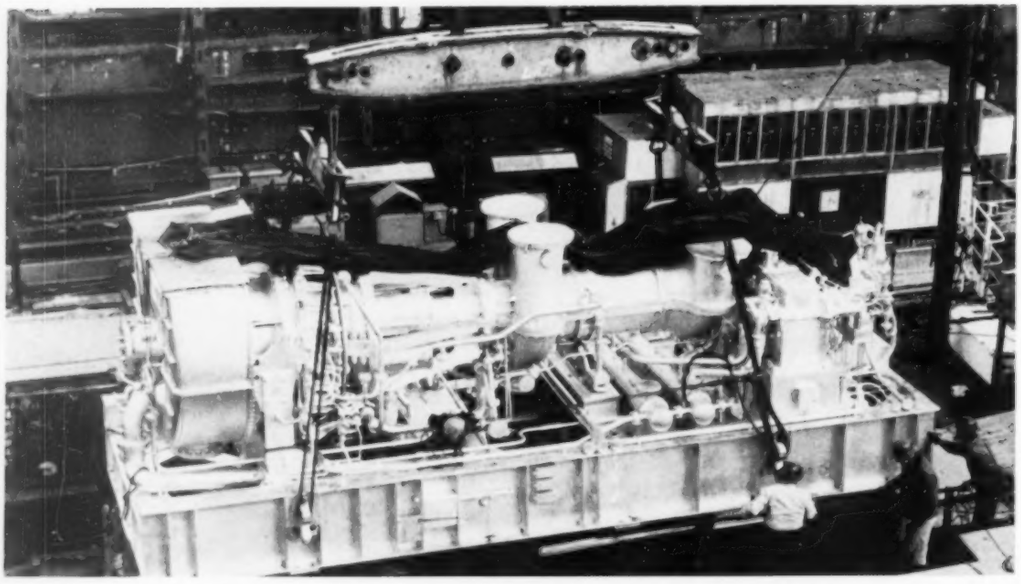
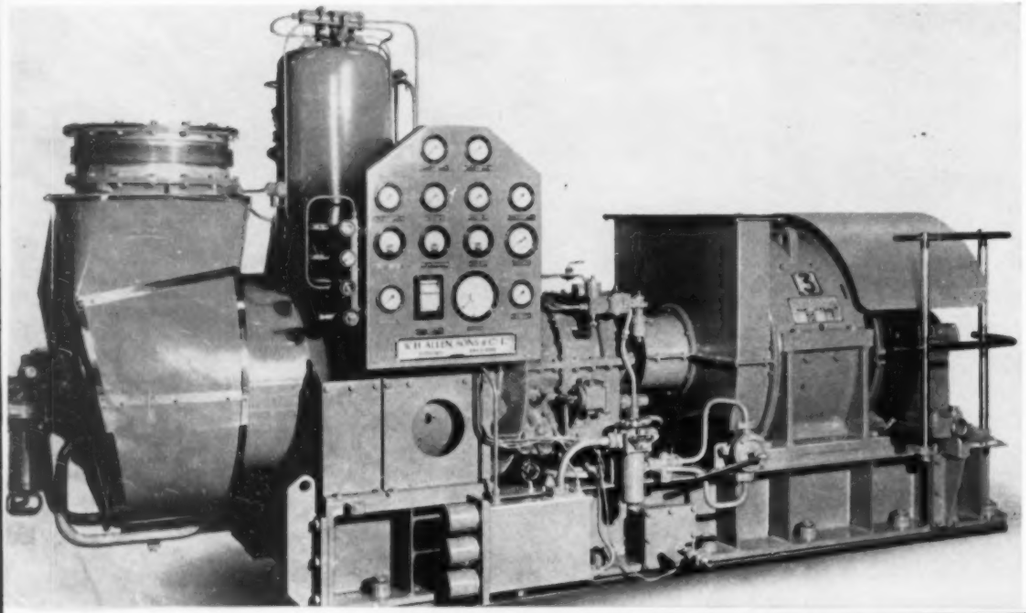


Fig. 3—Emergency generator, 350 kw, installed on Blue Funnel Line Ships. Photographs courtesy of W. H. Allen Sons & Co., Ltd.



ling, reduction gear and shafting. In the exhaust ducting from the turbine there are steam superheating coils for supplying superheated steam. After the gas is discharged from the regenerator it goes through a waste heat boiler to the ship's stack. The installation includes a water washing fuel treating system to enable the plant to burn residual type fuels. Provision is also made for an air intake duct with baffles to separate salt water in the air. The air is ducted directly to the compressor via an inlet silencer mounted over the compressor. The free piston plant installed on the *Wm. Patterson* consists of six General Motors GM 14 gas generators, two 3000 shp gas turbines with an astern element in each and a reduction combining gear. The gas generators are arranged side by side and discharge the gas to a common receiving manifold and thence to the two turbines through two lines. The manifold and main gas lines include expansion joints and all lines are of special fabrication to allow smooth flow. Control valves divide the gas flow to the turbine between the ahead and astern inlets depending on power demand. The air for the gas generators is taken directly from the room. Silencers are installed on the gas generator intakes. Each turbine exhausts independently. The *Wm. Patterson* was described in detail in the November 1957 issue of DIESEL PROGRESS.

Details of Free Piston Single Cylinder Gasifiers.

	GM 14 & GS 34	CS 75
Engine cylinder bore	13.4 in.	7.5 in.
Compressor cylinder bore	35.4 in.	20.75 in.
Overall length	14 ft	7.5 ft
Stroke–CMR (1)	2x18 in.	2x9.5 in.
Number of cycles/min–CMR	600	1,000
Mean piston speed-ft/min	1800	1,580
Gas temperature–CMR	840° F	470° C
Gas pressure–CMR	45 psi	45 psi
Gas horsepower–CMR	1230	420
Weight, tons	7.5	2.25
Gas flow, lbs/sec.	8.5	

(1) CMR–Continuous Maximum Rating.

The *Merignac* and *Catanac*, two small cargo vessels of 1100 tons have been operating along the Atlantic Coast from Spain to Germany since 1953. A total of over 25,000 hours of operation have been accumulated on the four gasifiers. Each installation includes two gasifiers, two 1000 hp turbines and a common reduction gear with a single output shaft. It is reported that aside from the 3 weeks annual overhaul, the ships had 4 and 8 days of interruption of duty because of free piston machinery trouble. The lack of vibration, small amount of attention needed at sea, low maintenance and operational flexibility have been observed. An auxiliary free piston 600 kw alternator set has accumulated 6500 hours on the tanker *Bethsabee*. This set is similar to four other sets installed in land applications and consists of two gasifiers and a turbine. Examination of one turbine set after 12,000 hours of operation indicated turbines could run another 24,000 hours prior to another inspection. Provision of a standby or extra gasifier and a conservative turbine design insures

continuous reliable operation of auxiliary sets at full power. The first auxiliary gas turbine generator sets are now in service on commercial ships of the *Dolius* class, see Fig. 3. Two motor vessels of the M. V. *Weybridge* class are being equipped with 300 kw generator sets. Whereas the 350 kw set has a fuel performance of 1.93 lbs per kw-hr, the 500 kw set on order for Naval use is almost fifty percent better. Waste heat boilers, in combination with either of these sets, could provide steam for in-port service when generators are used for standby operation. Three Creole Petroleum Company personnel boats are giving a very good account of themselves in service, powered by Boeing gas turbines as shown in Fig. 4.

TABLE I. SUMMARY OF MARINE INSTALLATIONS OF GAS TURBINE AND FREE PISTON-GAS TURBINE PLANTS

Engine	Naval		
	Number Ships	Number Engines	Total HP
Gas Turbine			
Propulsion	47	53	85,860
Auxiliary	171	255	49,780
Total	218	308	135,640
Free Piston-Gas Turbine			
Propulsion	21	42	37,800
Auxiliary	—	—	—
Total	21	42	37,800
Total			
Propulsion	68	95	123,660
Auxiliary	171	255	49,780
Total	239	350	173,440
	Merchant		
Gas Turbine			
Propulsion	9	13	22,900
Auxiliary	12	12	5,000
Total	21	25	27,900
Free Piston-Gas Turbine			
Propulsion	13	13	59,700
Auxiliary	1	1	800
Total	14	14	60,500
Total			
Propulsion	22	26	82,600
Auxiliary	13	13	5,800
Total	35	39	88,400
	Total		
Gas Turbine			
Propulsion	56	66	108,760
Auxiliary	183	267	54,780
Total	239	333	163,540
Free Piston-Gas Turbine			
Propulsion	34	55	97,500
Auxiliary	1	1	800
Total	35	56	98,300
Total			
Propulsion	90	121	206,260
Auxiliary	184	268	55,580
Total	274	389	261,840

TABLE II—GAS TURBINE and FREE PISTON-GAS TURBINE PLANTS IN MERCHANT MARINE INSTALLATIONS.

Country	Manufacturer	Model	Power Plant (1)	Plants /Ship	Application	Ship	No. of Ships	Status	Astern Power By
			FREE PISTON-GAS TURBINE UNITS						
France	SIGMA	GS34	2000 HP	1 (2)	Propulsion	Merignas Catanac	2	25,000 Hrs. Installed	Turbine
France	Sigma (Rateau)	GS34	600 KW	1 (3)	Gen. Set	Tanker Bethsabee	1	6,500 Hrs.	
France	Sigma (Rateau)	GS34	16000 HP	1 (4)	Propulsion		2	Ordered	Propeller
France	Smiths Dock (Alsthom)	GS34	2000 HP	1 (5)	Propulsion	Goodwood	1	Ordered	
England	Smiths Dock	GS34		1 (7)	Propulsion	Bolton S. S. Co.	1	Ordered	
England	Free Piston Engine Co.	GS34	7000 HP	1	Propulsion	Crest Ship Co.	1	Ordered	
England	Free Piston Engine Co.	GS34	2500 HP	1 (6)	Propulsion	Ore Carrier 800 Tons	1	Ordered Fall 1956	Turbine
England	Free Piston Engine Co.	CS75	200 KW	1 (3)	Gen. Set	Two Companies		Ordered	
England	A. Stephens Sons	GS34	4000 HP	1 (7)	Propulsion	Ormara	1	Ordered	Turbine
Germany	Demag	GS34	1400 HP	1	Propulsion	Fishing Trawler	3	Ordered	
U. S.	General Motors and Sigma	GM14	6000 HP	1 (8)	Propulsion	William Patterson	1	Installed	Turbine
			GAS TURBINE UNITS						
England	British Thomson Huston		1200 HP	1	Propulsion (Alternator) (Drive)	Auris	1	Removed after 17000 hrs	Electric
England	British Thomson Huston		5500 HP	1	Propulsion	Auris	1	Installed	Hydraulic
England	Blackburn	Turmo 600	350 HP	2	Propulsion	Launch	1	Ordered	Gear
England	Ruston & Hornsby	TA	1300 HP	1	Gen. Set		1	Installed	
England	Ruston & Hornsby	T-E	300 KW	1	Gen. Set	M. V. Weybridge	2	Building	
England	John Brown		200 KW	1	Gen. Set	New Zealand Ship Co.	1	Ordered	
England	W. H. Allen Sons	Type B1	125 KW	1	Gen. Set	Auris	1	Installed	
England	W. H. Allen Sons	Type D	350 KW	1	Emergency Gen. Set	Dolius Class	3 5	3 in service 2 on order	
Holland	W. H. Allen Sons	Type D	350 KW	1	Gen. Set	SS Rotterdam	1	Ordered	
France	Rateau—A.C.B.		3300 HP	1	Propulsion	Liberty Ship	1	Under test	Propeller
Italy	Metropolitan Vickers, Electric		5000 HP	1	Propulsion	Nuove Reggiane S.P.A.	1	Ordered	
U. S.	General Electric		6000 HP	1	Propulsion	John Sergeant	1	In Operation	Propeller
U. S.	Boeing Airplane	502-10c	200 HP	2	Propulsion	Personnel Boat	3	Installed	Gear
U. S.	Solar Aircraft	Mars	45 HP	1	Fire Pump	W. M. Patterson	1	Ordered	Gear
U. S.	Solar Aircraft	T-522	500 HP	2	Propulsion	Personnel Boat	1	Building	Gear

(1) A plant includes gas generators and turbines supplying power to a single propeller, generator or other power absorbing means.

	Gasifiers/Plant	Turbines/Plant
(2)	2	2
(3)	1	1
(4)	16	4
(5)	2	1
(6)	3	1
(7)	4	1
(8)	6	1

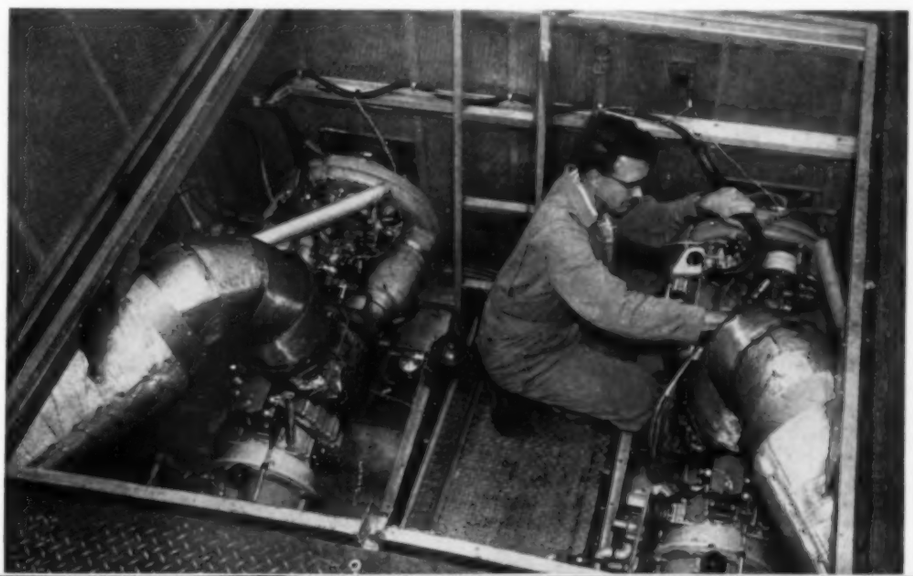


Fig. 5—Boeing Gas Turbines as installed in the Creole Petroleum personnel boats.

BIG DREDGE GETS NEW DIESEL PLANT

Bauer-Smith's *John H. Shary* Starts New Career with Cooper-Bessemer 4,000-hp Diesel And Complete Remodel Job

By RUEL McDANIEL

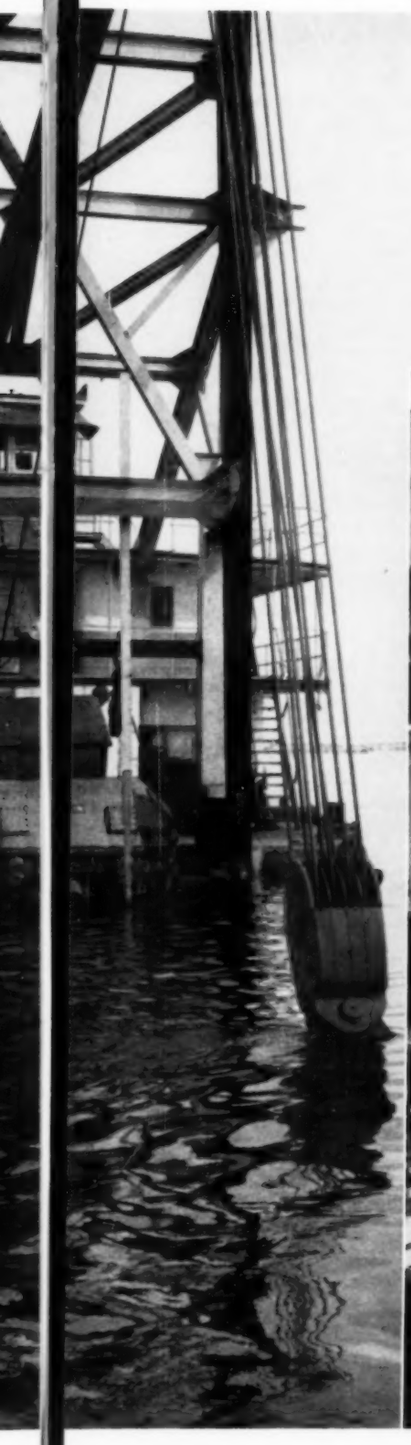
REJUVENATION is hardly the word for what has happened to the giant dredge which, between 1924 and 1953, was the *C. B. Harris*, important unit in the dredge fleet of the U.S. Army Corps of Engineers. Rebirth is more fitting. The dredge was constructed in 1924 by Charles Ward Engineering Corporation at Charleston, West Virginia, for the Engineers, and when she was launched and for many years after, she was the queen of the fleet. She worked the rivers continuously until 1953, when she was put up for sale by sealed bid. W. H. Bauer, president of Bauer-Smith Dredging Company, Port Lavaca, Texas, knew dredges and he knew the old *C. B. Harris*. He knew some of the men who had operated her over the years, and he knew she still was a good dredge, if modernized to meet today's demands. When the bids were opened, Bauer-Smith owned another dredge. The company put her to work immediately after accepting possession on a job at Lake Charles, Louisiana, with the intention, when time permitted, of remodelling and repowering the unit. That needed time did not come until three years later. In the meantime, however, the new owners changed the name of the dredge to the *John H. Shary*, honoring the father-in-law of then Governor Allan Shivers of Texas.

The company started its remodelling program on the *Shary* in 1956 and completed the job and moved the dredge back into service early in 1957. She became the Goliath of the Texas dredge fleets and one of the most powerful dredging units along the Gulf coast. With her new 4,000-hp Cooper-Bessemer diesel engine and a 24-inch Ellicott pump, there is no structure along the coast or in the rivers that the reborn *Shary* cannot handle with ease and dispatch. The original hull was 175′ x 50′ x 8′. The new superstructure, including a new $40,000 gallows and A-frame, gives the dredge a new over-all length of 268 feet.

The A-frame and gallows were constructed and installed by Gulfport Shipbuilding Corporation, Port Arthur, Texas, and after their installation the dredge was towed to Beaumont, where the new engine was installed by Bauer-Smith men under the direction of Tim Milliet, in charge of maintenance for the company. The company used the dock and facilities of Bethlehem Shipyard for moving the giant engine onto the dock and into the hold of the dredge. This job was accomplished by doubling up two 50-ton cranes which lifted the new engine, with a net weight of 110 tons from the dock onto a barge lying alongside the dock and close between the dock and the dredge.

Depositing the engine onto the barge, the crew then realigned the two cranes and again hoisted the engine upward and into the hold of the barge. So closely was the unit placed that it was necessary to move it only one-sixteenth of an inch from its first

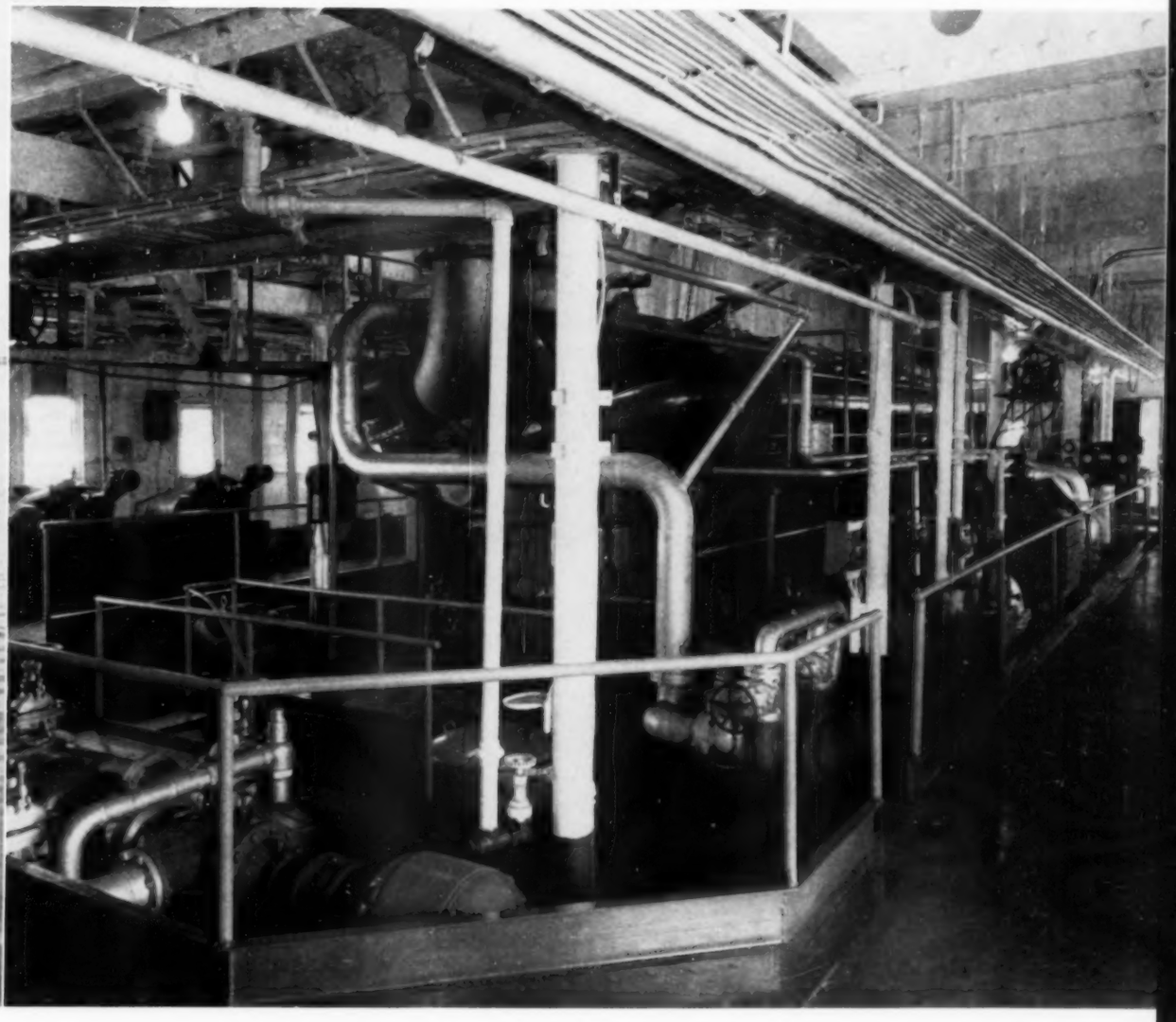
The *John H. Shary* at work on the Gulf coast of Texas. Note the big Maxim silencers on top deck servicing the 4000 hp Cooper-Bessemer diesel recently installed on this fine old dredge.



has an rpm of 345. There are two auxiliary engines. A 1475-hp Cooper-Bessemer with an rpm of 450, eight cylinders with a bore of 13″ and stroke of 16″. A General Motors diesel 567 has a rating of 900 hp, with a bore of 8½″ and a stroke of 10″.

The main engine and the Cooper-Bessemer have air starters, while the GM auxiliary is equipped with an electric starter. There are two General and sirens. These and the switchboard were installed by McIntosh Electric Company, Beaumont. The temperature of each cylinder of the main engine is recorded every four seconds, and the warning signals flash the alarm the second any cylinder's temperature rises above the safety point. Bauer-Smith Dredging Company operates five other dredges. The *Shary* gives the concern three modern hydraulic dredges; it has two shell dredges

The mammoth engine room showing the recently installed 4000 hp Cooper-Bessemer diesel equipped with Amot thermostatic controls and serviced by Woodward governor, American Air filters, Maxim silencers, Commercial filters and Young turbocharger intercoolers.



position to the exact point of installation. The company then towed the dredge to Port Lavaca, where its own personnel completed the installation. Among other major units installed were two 36-inch spuds weighing 60,000 pounds each, a cutter gear case, furnished by Lufkin Foundry & Machine Company, to take up to 1,200 hp, a cutter shaft 12 inches in diameter and a continuous dredging ladder.

The 4,000 hp Cooper-Bessemer diesel has 16 cylinders, with a bore of 15½″ and a stroke of 22″. It

Electric generators of 1,000 kw and 620 kw respectively. Duplex-type oil filters by Commercial Filter Corporation serve all three engines. Equipment also includes a Woodward UGB governor and two Ingersoll-Rand electrically-driven compressors. Thermostat controls are Amot, air intake filters are American Air Filter, exhaust muffler is by Maxim.

Fuel oil consumption averages 0.45 gallons per hp hour and the main engine uses about 24 gallons of lube oil daily. Alarm signals are by visual lights

and another is being converted to a shell dredge. Shell is big business with Bauer-Smith and other dredging outfits along the Texas coast. The company has its own maintenance and overhaul plant, including a machine shop. Of all its modern equipment, however, company officials are proudest of the reborn *John H. Shary*, for with its power stepped up from the original 1,600 hp to its present 4,000, and with a 24-inch pump at the end of that tremendous power, there is no formation, anywhere from soft mud to hard rock, that the new dredge will not cut and cut in stride.

DIESELS IN AN INACCESSIBLE AREA

A GLANCE at the picture below illustrates one of the more beautiful sections of the United States. Though beautiful, the area is not particularly accessible. The picture shows a view looking West from the Monument Valley Trading Post Lodge, Monument Valley, Utah. Monument Lodge sits astride the Utah-Arizona state line approximately fifty miles due West of the Utah-Colorado-Arizona-New Mexico corner. Most maps have a large notation about this area which reads as follows, "Travel in this area not recommended without guides". The note is a tribute to the ruggedness of the country and its remoteness.

The engineroom at Monument Valley Trading Post with five Witte diesels driving Electric Machinery generators. In right background, without hat, is Walther H. Feldmann, President of Worthington Corporation, of which the Electric Machinery Manufacturing Company is a fully owned subsidiary. Mr. Feldmann was for many years the chief executive of the Electric Machinery unit before being transferred to Worthington's headquarters at Harrison, New Jersey. He was vacationing in the famous "four corners" country when he "found" this interesting little self-reliant diesel plant.

Visitors to Monument Valley Trading Post do not necessarily expect all the comforts of home. They will find, however, that Monument Valley Trading Post has electric power. More correctly, diesel electric power. The photos illustrate the unique power plant for the Post. The plant is in twenty-four hour service and supplies power to the entire lodge. The plant consists of five (5) Witte diesel engines (Single-cylinder) rated at 12½ hp at 750 rpm. The engines are Witte model CDTBA. They start and operate on low cost diesel fuel oil providing twenty-four hour per day dependable and economical power. The reliability of these units makes them ideal for applications for much depends on trouble-free electric generating sets for primary power. The engine generator sets were sold by Witte's Salt Lake City, Utah distributor, Diesel Electric Service and Supply Company.

The generators are rated at 10 kva, 8 kw, 1800 rpm. They were manufactured by Electric Machinery Mfg. Company, assembled and coupled to the Witte engine by the Witte Company. Since the engines are running at a relatively low speed, the generators are belt-coupled to provide the proper operating speed. A large sheave to sheave ratio is required and is used to good effect by mounting a flywheel on the opposite side of the driven sheave, thereby smoothing the voltage, insuring power of fine quality. The units lend themselves to paralleling. For peak service all units are placed in operation. During light load periods routine maintenance can be performed on one or two of the "down" generators while the remaining three continue to operate in parallel. Power is uninterrupted.

Monument Valley Trading Post is owned by Mr. Harry Goulding. (Glasses). Operating the power plant and functioning as Mechanical Superintendent is Mr. Jack Sleeth. The remoteness of the Post can be realized when one considers the nearest railhead to the South is Flagstaff, Arizona which lies some 150 miles away, as the crow flies. To the Northwest, the nearest railhead is Cedar City, Utah which also lies some 150 miles away. Access to Monument Valley Trading Post is an all-weather road which approaches the Trading Post from the Northeast. This rugged country requires rugged equipment. The diesel electric generating units are rugged and have performed faithfully and well under difficult circumstances.

WASHINGTON IS UNREELING NEW FREEWAYS

By F. HAL HIGGINS

UP on the northwest corner of the U. S. modern diesel power is tooling a great freeway system in step with the national program. The Washington State Highway Commission is doing a bang-up job of planning and managing the construction of this system. My visit to Washington in July brought me up to date on the progress of its road building. In order to get the facts right out of the official sources, I called on the Commission and worked out a 2-day drive-around with Associate Editor Donald M. Brown, of its monthly News. For the second year in succession, contract awards on Washington road building are up to all-time highs. The first four months of 1957 more than $17,750,000 in construction contracts were awarded. The total for the year is forecast at over $66,000,000. This compares with over 45 million in 1956.

Washington has plenty of mountains and low coastal stretches to challenge the engineering know-how of its contractors who are winning the bids and betting their management against the known factors of time and materials and the unknown whims of weather that may upset the best calculations. But contractors in the Northwest have gained plenty of experience in the past twenty years while building such world-topping dams as Grand Coulee, Bonneville and lesser dams between these two super jobs that teamed up the best heavy construction firms of the U.S. While dam construction has overshadowed road and bridge building over the World War II and post-war era, as in all areas of the West, one finds many little contractors coming up from small jobs to the big ones as they gain experience and capital. There's no substitute for experience in these jobs, no two of which are exactly alike. But all heavy construction jobs are heavily tooled with diesel power. Trucks, self-propelled scrapers, motor graders, tractors wearing bulldozers and rippers, front loaders, shovels, cranes, compressors, etc.

Director of Highways William A. Bugge had this to say about the famous Snoqualmie Pass that I got a 2-day look at as I toured it from Seattle east over the rugged pass and on to Yakima and return via Rainier National Park: "Snoqualmie Pass is an important part of the State's highway system. It is necessary that it be four-laned as quickly as possible. This year should see four-laned the remaining gap between Seattle and the summit. The work necessitating the closure for 8 hours a day 5 days a week is along the shores of Lake Keechelus. There is little space for maneuver. To blast and remove this rock and accommodate the traffic would lead to peril of life and limb. This discomforts and inconveniences many people, but the benefits of the four lane section means an awful lot to an awful lot of people."

Our state car with Don Brown at the wheel hit the pass area about 11 a.m. and with his state pass we had no trouble getting into the active heavy rock blasting and handling area on the edge of the lake. High fog blocked out sunshine from giving us quality picture shots at the drama of 2-level diesel shovels, trucks and tractors cutting off a mountain's shoulder as it was broken up by dynamite blasts after hard rock was drilled with compressed air from diesel compressors. One quickly noted a different balance among makes of diesel equipment in the Northwest than he encounters in California freeway building. International is stronger in all its heavy lines—motor trucks, TD24's and 18's and also self-propelled scrapers. Three of these were found doing a bang-up job of loading earth from one side of the freeway and moving it through an underpass to the other side in building a rural access road to the freeway. Contractor was highly pleased with the performance of his two 2T55's and one 2T75 that were working alongside in a fleet with one older GM Euclid powered by a GM engine.

Access roads for logging add safety. Getting logs from timber areas being harvested to mills and markets is of top importance in the Northwest. Loggers have been battling for more and better access roads to get their harvested timber out to the paved highways and for bigger trucks with air brakes to cut cost and increase safety on the highways. Over 85% of the timber harvest of the west is hauled over roads by trucks. Tourists and home auto traffic have complained bitterly about the slow road blocks and danger from wrecks with motor trucks loaded with logs on the twisting mountain terrain. The new highway plans are solving this problem and will in a few years eliminate it. Over $2,000,000 will be invested in forest roads in 1958, according to estimates made by Forest Service and Washington State Highway Commission representatives.

Grade separations are being erected everywhere, it seems, as you get out over the freeways. They cost money, but they take out the road blocks once and for all in most cases where the highway engineers have learned to survey their present needs and forecast the population of ten to twenty-five years from now.

Road jobs now in the works. As we traveled over the freeway construction jobs east from Seattle, we had a look at both equipment and roads under construction. Equipment was practically all diesel as far as the trucks, tractors, cranes, shovels, compressors, graders, scrapers and loaders are concerned. Here is the line-up noted at Strong & McDonald's job up eight miles above Yakima as we stopped and noted it was all down for noon: 2 Northwest shovels with Murphy diesel engines. 3 Koehring Dumptors with GM engines. 1 Michigan loader with Continental diesel engine. 1 Allis-Chalmers HD18. 1 Cat D8. 1 Cat motor grader 12.

Among the five contractors seen working on the Snoqualmie Pass, Bucyrus-Erie, Manitowoc, Northwest and P&H shovels with Cummins NHIRS, GM, Cat and Harnischfeger engines were noted. Loaders were International's Payloaders, Cat's Traxcavator,

Fleet of LeTourneau-Westinghouse loading from a Bucyrus-Erie 54-B on freeway job of Harrison Brothers, Tacoma. G.M., Cummins and Caterpillar diesels powering equipment.

Model C LeTourneau-Westinghouse, with Cummins diesel, one of a fleet of three working on Harris Brothers' piece of the Washington Freeway east of Seattle.

Clark's Michigan and Allis-Chalmers Tractor. Scrapers of the big self-propelled types ran GMC's Euclids with usually their own power, and LeTourneau-Westinghouse with GM or Cummins engines. The old firm of Howard Cooper Corp. with nearly forty years in the game of distributing heavy logging and dirt moving equipment has kept the "big red" of International high in the battle up on the Northwest corner. Howard-Cooper is pointing with pride to the big new diesel motor trucks International calls the Payhauler. They are certainly looking great on jobs we saw in both Washington and Oregon. The Payhaulers are usually powered with Cummins engines in the big sizes. There are plenty of Macks, GM Euclids, and some Whites in this dirt field.

International Payhauler powered by Cummins on a railroad re-location job for the freeway east of Seattle. Howard-Cooper Corp., International distributor for both Oregon and Washington industrial lines, is having a great year on this new International heavy duty truck.

In logging, of course, the Peterbilt and Kenworth trucks are strongly represented as in all long haul freighting up and down the Coast. Compressors find the famous old Ingersoll Rand well entrenched with GM, Cat and International engines. All engine manufacturers are strongly represented with marine, logging, farming and heavy construction fields to serve. Allis-Chalmers (formerly the Buda), Continental, International, Cat, Hercules, Waukesha, GM, Cummins, Murphy, White, Fairbanks-Morse, Enterprise, Nordberg, and the imported British and German Lister-Blackstone, Petter, David Brown, Deutz and Rolls-Royce are all represented in the Northwest with distributors who are serving specialized or the whole field of diesel needs. It's a healthy competitive industry that one finds here. The power buyer is the big gainer in equipping and re-equipping his skilled labor to cut his costs and make a profit as he serves his public.

Oil serves smoothly in oilless empire. One never ceases to marvel at the high efficiency of the oil industry under any and all conditions. When a job of greasing and powering internal com-

An International Harvester payscraper at work on a new freeway through the high mountain area.

I and more so since WW II, population growth has built up the great area east of the mountains with enough farm, logging and heavy construction business to give the crawler tractor manufacturer more outlets. Here are the way these manufacturers are represented in Washington:

J. I. Case Company: Seattle, Burlington and Chehalis in the west; Yakima in the famous apple country. International Harvester Co.–Howard Cooper Corporation, Seattle, Modern Machinery Co., Spokane. Allis-Chalmers Co.–Pacific Hoist & Derrick Co., Seattle; American Machine Co., Spokane. Caterpillar Tractor Co.,–Collins Machinery Co., Seattle, Mount Vernon and Port Angeles. Murphy-Campbell Co., Tacoma; Halton Tractor Co., Longview: Byrne Machinery Co., Spokane and Rizville Stone Machinery Co., Walla Walla; Webb Tractor & Equipment Co., Yakima, Pasco, Ellensburg, Toppenish; Columbia Tractor Co., Wenatchee.

Euclid Division of GM is represented in Seattle by Evans Engine & Equipment Co., at Spokane by International Equipment Co. Inland Diesel & Machinery Co., Spokane, distribute the LeTourneau-Westinghouse line. In the shovel, dragline and crane field, Northwest with Murphy diesels as their heart were in evidence along the operations we noted. Alaska Pacific Supply at Seattle, and General Machinery Co. at Spokane handle the Murphy diesels.

HD16 on West Fork Timber Company, Tacoma, Wash. operations. Used to build cheap access roads for logging trucks.

bustion engines is to be done, the big oil outfits are there ready to serve. Until a recent "strike" made Washington another "oil state" with its first producing well in southwest coastal area, the Northwest was an importer of all the needed oil field products for diesel, gas engines and fuel. By boat, truck and pipe line the great oil companies –Standard of California, Shell, Texaco, Union, GP, etc.–refineries and pipe lines are constructed at the strategic spots to keep ahead of population and engine demands. And oil company service is something that always raises higher standards for the rest of the retail outlets wherever it starts up. No salute to progress is too high for the oil industry wherever one goes in the construction field.

Diesel distributors top service. With most of its population and business in western, or the Pacific slope area with a mountain chain between the rainy west and the drier and more sparsely populated eastern side of the state, location of distributors and branch houses has always been traditionally in Seattle with Spokane the subsidiary for branches of the main distributor. Since World War

M/V *SALLY POLK*

By DOUGLAS SHEARING

TECHNICAL details:—The towboat, *Sally Polk's* dimensions are: Length overall (molded), 148 feet; Waterline length at 8-foot draft, 144 feet 3 inches; Beam (molded), 34 feet; Beam (extreme), 34 feet 7 inches; Depth at side (molded to main deck), 10 feet 6 inches; Sheer Forward, 2 feet; Camber of superstructure deck, 5 inches in 34 ft.

Hull, rudder and propeller designs are based on Dravo's continuing research program, which has included extensive model basin testing over the past several years. The *Sally Polk* is designed to tow a 4-barge fully integrated tank fleet. She is powered by twin General Motors, model 16-567C, marine diesel engines, equipped with reverse-reduction gears. Each engine delivers 1600 continuous horsepower at a propeller speed of 212 rpm. Engines and reverse-reduction gears are mounted amidships in the hull on an integral base. Fuel tanks are located forward and aft, and to either side of the machinery space. Wash water is stored in the forepeak tank, drinking water in independent tanks in the forward and aft holds. Both hull and superstructure of the vessel are of welded steel construction throughout. The superstructure includes the main deckhouse, upper deckhouse and pilothouse. In the main deckhouse are quarters, lounge and toilet facilities for a crew of eight, an all-electric galley, a mess room seating ten, machinery space, steering gear compartment and deck stores space. Quarters, lounge and toilet facilities for eight officers and guests are contained in the upper deckhouse. The pilothouse, located atop the forward end of the upper deckhouse, houses controls for complete towboat operation, with the exception of engine starting.

Shown during trial runs on the Ohio River is the new diesel towboat *Sally Polk*, built for Canal Barge Company, Inc. by Dravo Corporation, Pittsburgh. The 148-foot, 3200-horsepower vessel, which is the first Dravo-3200 towboat to enter service, was christened at the Canal Barge Company dock in New Orleans, La. She will push integrated petroleum or chemical tows between New Orleans and St. Louis and Chicago.

Electric power for 440-volt, three-phase, 60-cycle alternating current is supplied by two Detroit GM diesel generators of 75 kva 60 kw capacity. Fenders and the four towing knees are of all-steel, welded construction. The towing knees are built into the forward end of the hull, forming a part of the headlog. Hull fittings include two five-foot kevels, a 10-inch towing bitt fitted forward, nine four-foot kevels, ten single-roller button chocks with 15-inch-diameter rollers, one electrically-powered double barrel capstan and two hand-operated deck winches. The *Sally Polk* has two steering gear systems, one for flanking and one for steering ahead.

Steering engines are located above deck level for easier access. Each system consists of a double-ended hydraulic ram, steering control valves and control and follow-up mechanism. Both rams are connected to a common hydraulic accumulator and pump. A second pump cuts in automatically when pressure falls to approximately 75 psi below operating level. Steering is controlled from the pilothouse console by means of push rods running to the steering compartment. Through the follow-up system, the rudders remain at the same angle as the levers in the pilothouse, giving the pilot a constant indication of rudder positions. Six streamlined, balanced rudders control the vessel's course. One rudder is located aft of each propeller for steering ahead and two forward of each propeller for flanking.

The four-bladed propellers are 8 feet, 6 inches in diameter, and made of high tensile, stainless steel. Their pitch, area and blade form have been designed by Dravo for use with the Dravo Kort nozzle. Just forward of each propeller is a single-armed streamlined steel strut which supports the propeller shaft. Both propellers rotate inboard. Each compartment can be emptied by the fire and bilge pump through a bilge manifold located in the forward engine room. An auxiliary bilge suction system in the engine room operates from the cooling system raw water pump on one engine.

Check plugs in the bilge manifold prevent bilge water from flowing when pumping through the fire main. The fire pump gets its suction from the main injection header. Taking their suction from the injection pipe, the engine-driven raw water pumps discharge to the jacket water cooler. Most of the discharge is carried overboard from the heat exchanger, except for some raw water which is bypassed to the gear lube oil cooler and then to the stern tube to lubricate the strut bearing.

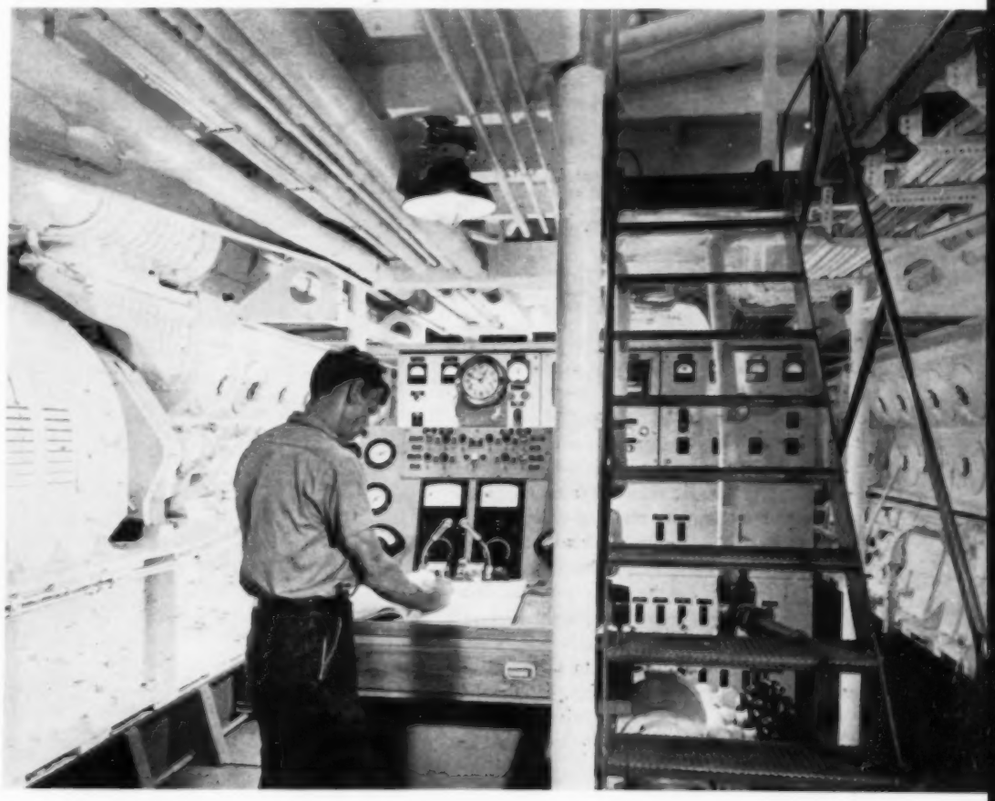
The *Sally Polk* is equipped with the most modern navigation equipment, including radar, ship-to-shore radio, a teletalk system, an airhorn and a 16-inch steamboat bell with electrically-operated clapper. Two 19-inch, 45 ampere electrically operated carbon arc searchlights and a manually operated 1000-watt incandescent floodlight are mounted on the pilothouse roof. Two 500-watt incandescent floodlights are provided on the after end, one port and one starboard, also two 500-watt incandescent floodlights are provided on the forward end, one port and one starboard. Navigation lights include two side lights, two towing lights, two range lights and one anchor light, all controlled by a seven circuit, tell-tale panel located near the pilothouse control console. A boat crane of two-ton lifting capacity is located aft on the roof of the main deckhouse. In addition to the combination fire and bilge pump, fire-fighting equipment includes: two 50-pound CO_2 cylinders and a locally controlled hose reel with 50 feet of hose in the engine room; one 35-pound CO_2 bottle with remote control for the paint locker; four 15-pound CO_2 portable hand type extinguishers; two 5-pound CO_2 extinguishers; six 2½-gallon foam type extinguishers, and four of the standard fireman's axes.

An oil-fired boiler generates steam for hot air heaters. Hot air is forced through ducts to all living quarters, showers and mess room. Unit heaters are also located in the pilothouse, lower engine room, forward hold compartment, rope locker and steering compartment. The galley is equipped with an electric range with oven, a stainless steel-topped sink, a 54-cubic-foot reach-in refrigerator, a nine-cubic-foot night service refrigerator and an 18-cubic-foot deep freezer. The mess room and galley are located aft of the engine room in the main deckhouse, the mess room on the port side and the galley on the starboard side. Quarters for the maid and the cook are located just forward of the galley.

Equipment List

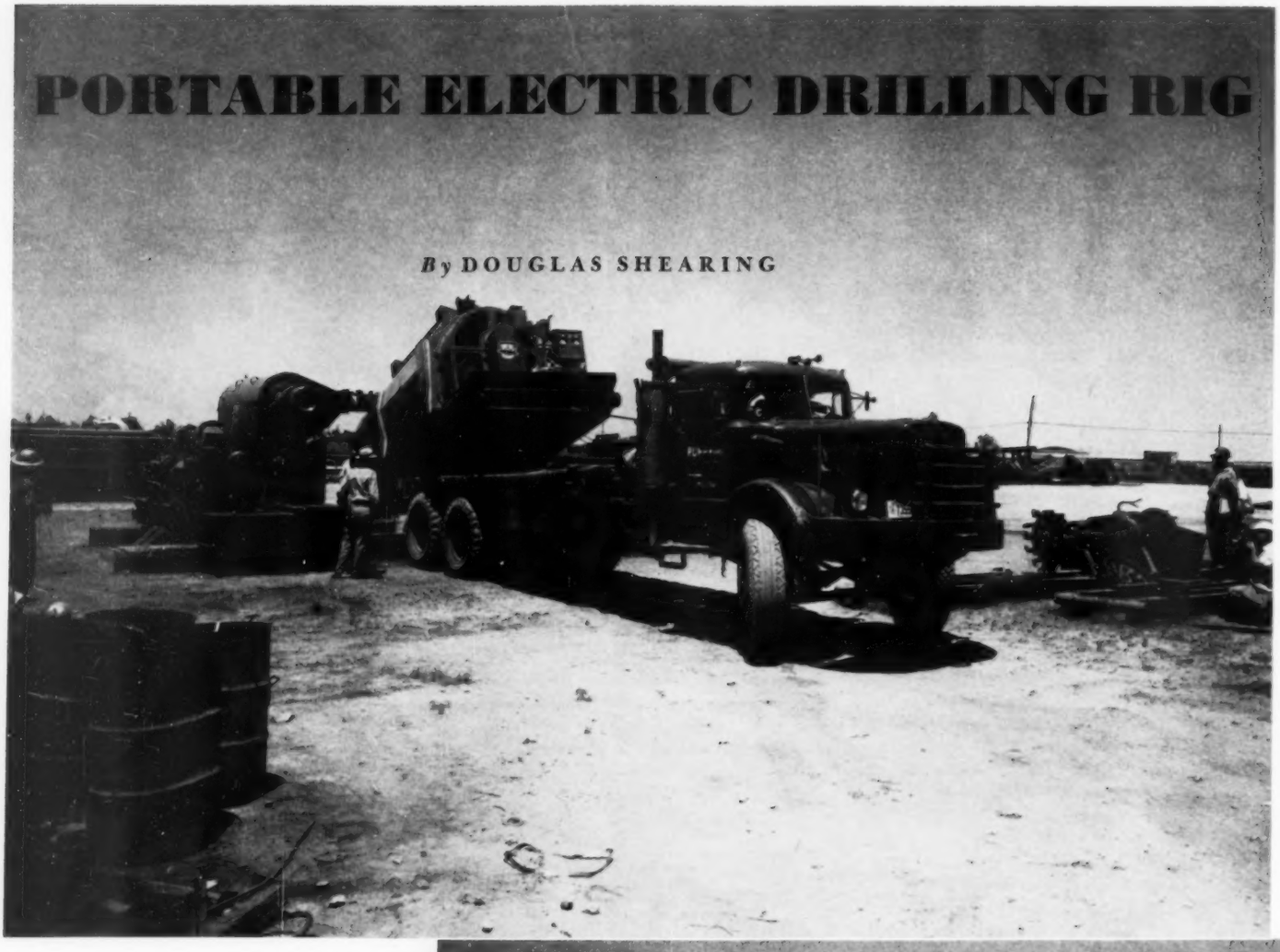
Main engines	Model 2-16-567C, G.M.C.
Reverse & Reduction Gears	Falk
Air Compressors	Gardner-Denver
Lube Oil Filters	Hilco
Lube Oil Strainers	Air Maze
Shell & Tube Jacket Water Coolers & Lube Oil Coolers	Ross
Intake Air Filters	Air Maze
Generator Units	General Motors Corp. (Delco)
Fuel Oil Transfer Pump	DeLaval Steam Turbine
Water Filters	Cuno
Switchboard	Lake Shore Electric Corp.

Engine room of the newly christened towboat *Sally Polk* has convenient engineer's control console built by Lake Shore Electric Corp. All equipment is readily accessible for easy maintenance. Vessel, which is powered by two General Motors (Cleveland) diesel engines delivering 1600 horsepower, each with Marquette Governors, was built for Canal Barge Company, Inc. by Dravo Corporation, Pittsburgh.

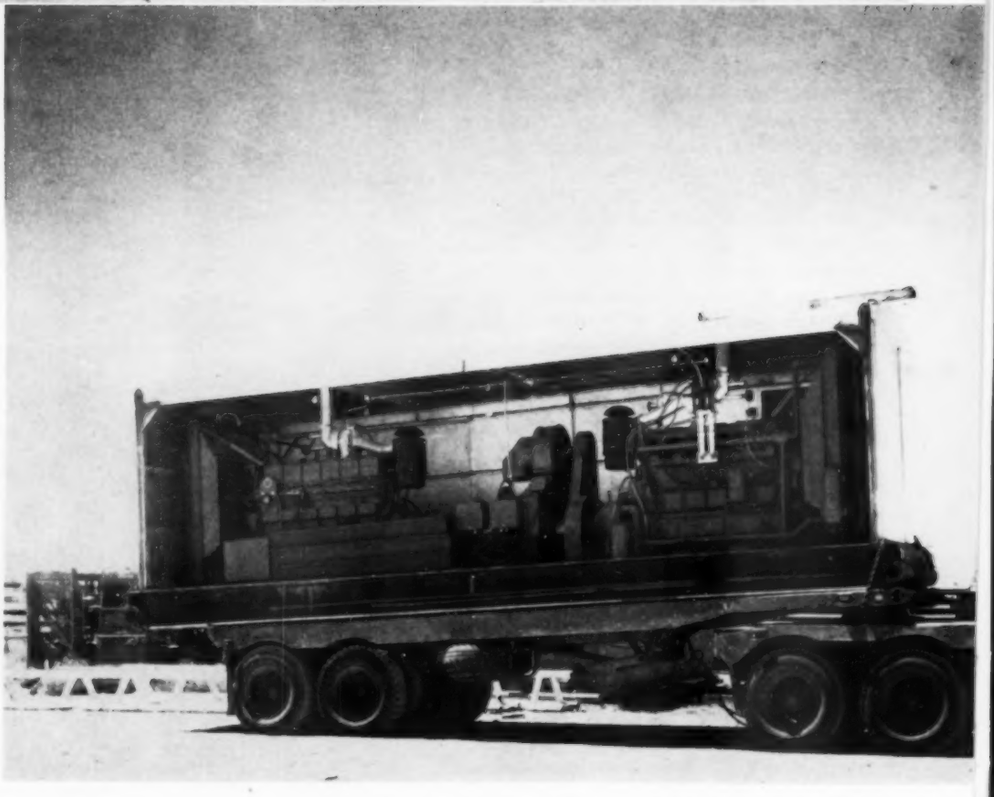


PORTABLE ELECTRIC DRILLING RIG

By DOUGLAS SHEARING



The drawworks and motor assembly is being winched aboard trailer truck in Great Western Drilling Co. yards.



One of the prime power packages, two Cummins diesel engines attached to an electric drilling generator, are secured aboard truck.

THE Great Western Drilling Co. has begun drilling what may become the world's deepest hole near Ft. Stockton, Texas after a record-breaking move along West Texas highways with a heavy-duty drilling rig carried in a 17-truck convoy. The drilling company, in a fraction of the normal time, had the rig unloaded from the trucks, and its major components ready to drill within a day-and-a-half of the time it left Odessa, 125 miles to the north. The more-than 22,000 ft well is being drilled for the Phillips Petroleum Co. The rapid move and setting-up was possible because the rig, diesel-electrically driven, is one of the first of heavy capacity designed to take full advantage of the extreme portability possible with an electric drive. The electric drive itself was built by General Electric's Locomotive and Car

The rig is in Odessa ready to start. On first trailer is the drawworks and motor assembly. Tall, boxy trailer loads toward rear contain Cummins diesel-engine-drilling generator power packages.

Equipment department in Erie, Pa. The significance of the race against the clock was pointed up when a drilling company official noted that a drilling contractor can lose as much as $1,500 a day while a rig is not producing. Basically the drilling rig consists of a U-1220 drawworks manufactured by the Unit Rig and Equipment Co. of Tulsa, Okla. and six Cummins LRT-600 turbocharged diesel engines with maximum rating of 450 hp at 1100 rpm. This is the first time this type of engine has been connected to a generator in this fashion for diesel-electric drilling. The transmission is General Electric's S-343 drilling rig package which is made up of three GE752K drilling generators which supply power to four GE752H shunt-wound drilling motors rated at 625 hp continuously and 1000 hp intermittently for drawworks duty. Two motors are connected directly to the drawworks. Two mud pumps are each driven by a drilling motor. Two diesel engines are directly coupled to each generator. The rest of the drive equipment includes a main control panel, driller's console, and electric cable. The mud-pumping system has about twice the storage capacity normally found on a rig of this type. It includes three 50 ft steel tanks and two 30 ft tanks. The rig was sold by the Mid-Continent Supply Company. The electric drive it uses permits speed in handling primarily because it is comparatively easy to set up upon arrival at location. The electrical drive components need not even be located near each other because they can be quickly connected with flexible electric cable. The heart of the rig, the power end, breaks up into seven skid mounted trailer loads. The drawworks and motor assembly makes up two loads, each of the three engine generator power plants form a load and each of the two mud-pump assemblies are a trailer load. A massive drilling derrick has been constructed at the drilling site.

IRON MINING ACTIVITY AT BOOM PROPORTIONS IN SOUTHERN MISSOURI

MISSOURI iron ore—once deemed unprofitable to market by industrial mining concerns in general—is today sustaining one of the largest mining booms ever experienced in the state. Current mining activity is centered in Howell and Oregon counties near the Arkansas border where approximately 20 mining companies are engaged in open pit operations. Drilling for new deposits are now also in progress in counties further north and an extensive underground project involving production estimates of two million tons annually is taking form near St. Louis.

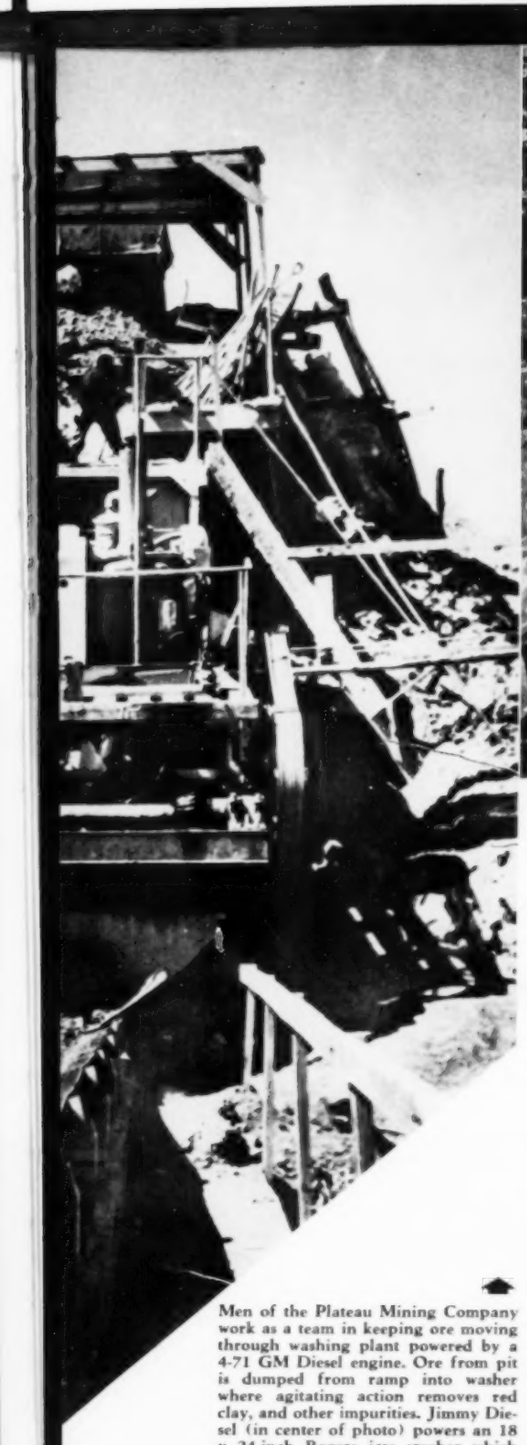
Factors causing renewed mining interests in Missouri are outlined as first, an expansion in the steel industry creating demands on previously unexploited iron ore deposits and secondly, the accessibility of Missouri deposits to steel mills of the South and Midwest which hitherto looked to Canada and South American countries for fresh sources of supply. Once worth $2.00 a ton, Missouri ore is now attracting ore-buyers who are willing to pay three times its former value. One Illinois steel concern pays up to $9.50 a ton for limonite. Other factors are the properties found in the ore which make it a good blending agent for improving the quality of other ores. Missouri ore while high in impurities is generally low in phosphorus content and when blended with ores of other ranges reduces overall phosphorus percentage at the mill. Backbone of the current boom is made up of small-scale mine operators who mine from 200 to 500 tons per day. Ore is shipped mostly from the rail center at West Plains, Mo., to steel centers at Birmingham, Ala., Nashville, Tenn. and Granite City, Ill. In 1956 railway bills of lading showed that 130,000 tons of iron ore had been shipped from the West Plains area—twice as much as that mined in the entire state in previous years. Most mining operators rely on Diesel engines to drive their equipment which includes shovels, washing plants and deep-well water pumps. As the ore is generally found in small pockets rather than in continuous veins, frequent moves of equipment are necessary. For this reason much of the equipment is powered by Diesels having high power to weight ratios which, of course, contribute to the portability of the units. General Motors two-cycle Diesels are presently being used in practically all types of equipment operating in the area.

One of the largest and most productive ore mines of Southern Missouri is this 400 x 400-foot cut presently being worked to a depth of 65 feet by the Plateau Mining Company near Koshkonong, Mo. Recently, exploratory drilling on the floor of the cut disclosed the presence of ore to an additional depth of 75 feet. A ¾ yard Link Belt shovel powered by a 4-71 GM Diesel engine is visible in pit loading ore for trucking to washing plants. Shovel must handle four truck loads of pit material to produce the equivalent of one truck load of washed ore.

Erection of a new washing plant nears completion in Oregon county—heart of current mining boom. Diesel engineer at left installs a 127 horsepower GM Detroit Diesel engine on the plant's washing system while welders (upper in photo) finish assembly of a 24 x 36-inch Lippman jaw crusher powered by a 3-71 GM. Engine dependability is essential as one engine failure can halt the entire operation which could mean losses up to $2200 per day. The plant is owned by Wade Miller and Howard Reynolds, their second venture since entering the mining business three years ago.

Diesel-powered deep-well pumps around the clock to replace water in the reservoirs lost through use and evaporation.

Settling ponds formed by man-made dikes are maintained on several mining sites to help conserve the water supply. The ponds are strategically located down hill from the washing plant so as to trap the used water until impurities have settled. Water is then returned to the reservoir through overflow locks for re-use. Men of the Missouri iron range are do-it-yourself advocates who cut and maintain their own access roads and build and engineer their own washing plants. Typical of the operators is Wade Miller, a former sawmill operator and Howard Reynolds, a garage repairman. Three years ago the two men leased a 40-acre tract of land near Koshkonong, Mo. with only $2500 between them. They recently sold their mining interests there in favor of starting up at a new location and were paying $2200 per month in royalties alone to the owners of the land.



Men of the Plateau Mining Company work as a team in keeping ore moving through washing plant powered by a 4-71 GM Diesel engine. Ore from pit is dumped from ramp into washer where agitating action removes red clay, and other impurities. Jimmy Diesel (in center of photo) powers an 18 x 24-inch Rogers jaw crusher which breaks up large hunks of ore before washing. Man in foreground removes rock and flint from washed ore as it moves along conveyor to hopper. Average day's production consists of about 500 tons of processed ore.

The lean ore content of some Missouri deposits requires dressing down the ore before it is shipped. Washing plants rely on the simple agitator action of two large rotating augers mounted horizontally in a water tank below the hopper to remove red clay and other impurities. About 25 per cent of the material trucked from pit to washing plant emerges as good ore. Water consumption on some plants is as high as 40,000 gallons of water per hour. In areas where there is no natural water supply, reservoirs must be constructed to insure ample water supplies. Some miners must employ

Ken Hurt (right) engine salesman for Western Machinery and Engine Company, GM Diesel engine distributor at St. Louis, is a veteran of three years sales experience in the Missouri ore fields. His customers include approximately 20 mining companies operating in Howell and Oregon counties. Visiting with him are Lou Bach, production superintendent of the Oresco, Inc. mine and Hugh Hudgen, shovel operator.

TEXAS PIPE LINE AUTOMATIC STATIONS

UNATTENDED operation of six Nordberg engine-pumping units is a prominent feature in the Evangeline Products System's current expansion program. The 1720 hp, four-cycle Supairthermal engines are at two identical, full satellite stations of this product pipeline. The 16 inch pipeline carries refined products from Port Arthur, Texas to Baton Rouge, Louisiana, a distance of 189 miles. It supplies an increasing demand from an increasing supply. The pumping capacity of 170,000 barrels daily allows for anticipated growth and currently is in excess of requirements.

There are four pumping stations in the Evangeline System. The stations at Port Arthur and Lake Charles are electrically powered, while the Jennings and Port Barre stations are each powered by three Duafuel engines. The Jennings station has been on push-button control since July 1956 and Port Barre was put in operation last February. The electrically-driven station at Lake Charles is also a satellite running unattended. Port Arthur is the master station from which the other three are controlled. The Supairthermal engines at Jennings and Port Barre stations are eight cylinder Duafuel units with 13 in. bore and 16½ in. stroke operating at 500 rpm. Each engine drives a four stage centrifugal pump, rated 4410 gpm at 1400' tdh through step-up herringbone gears, with a ratio of 500 to 2402 rpm.

When a satellite station is put on stream, the operator at Port Arthur first checks the line pressure at the satellite station which is telemetered to the central control panel. He presses a button to open the station suction valve and another which closes the station main line back gate thus routing the full stream into the station loop. Another button is then pressed to activate the station start sequence. Pump room ventilation blower, crankcase vent blowers and auxiliary lube oil and engine cooling water pumps all start five minutes before engine is started. Meanwhile suction and discharge valves to main pump are opened.

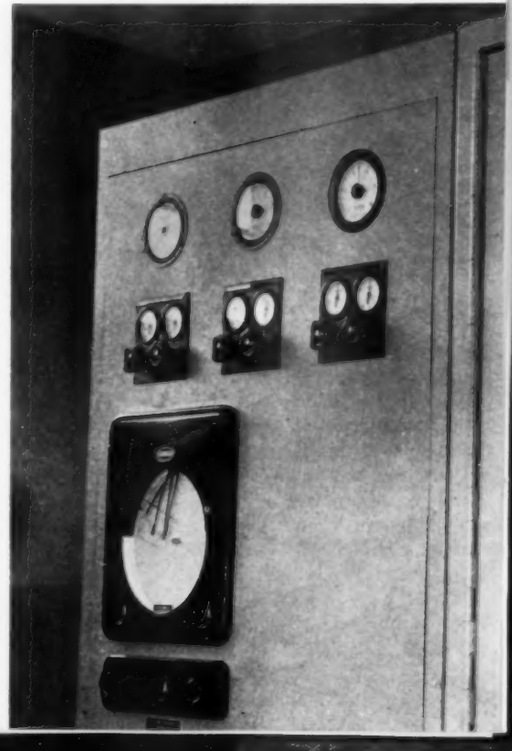
After the five-minute lapse of time, a starting air solenoid-operated valve opens and the Nordberg starts on diesel fuel. When it comes up to idling speed, water pump pressure opens the circuit on the solenoid valve and shuts off the starting air supply. After five minutes of running idle, the line controller goes into operation and permits the engine to speed up to the rpm required by incoming and outgoing pressure. A pneumatic controller speeds up or slows down the engine to maintain minimum suction pressure or limit discharge pressure within the permissible speed range. When the engine has been running long enough to bring the lube oil temperature up to 140° F., the engine automatically goes on dual fuel operation. Should an engine fail to start, the starting air solenoid is reenergized for four seconds and closes for 20 seconds for a second try. This is repeated a third time and if no start occurs a shut down relay is energized and shuts down and locks out the unit. Two engines can maintain full line capacity at each of the two stations. Procedure for starting and going on stream is of course the same for all three engines at both of the new stations. After the first unit starts operating normally, the Port Arthur operator starts another one with the same sequence. When the suction valve on the second unit is opened, the first engine slows down permitting the suction pressure to build up briefly while the second unit starts and in five minutes the speed of both increases and the units are then put under the same pneumatic control. Similar procedure occurs when the third unit goes on stream.

During operation, each of the pumping units is under control protection against engine overspeed, excessive jacket water temperature, low lube oil pressure, vibration, high bearing temperature at four points on the gears, excessive leakage at two points on the pump seals, high temperature of pump bearings at two points and high temperature of the pump case at one point. Station protection is provided against stoppage of the ventilating blower, low suction pressure, abnormally high discharge pressure and leakage of products spilled on the floor. Spillage is carried via drains to the sump which is equipped with a float and switch to actuate emergency shutdown devices if leakage becomes serious.

To protect the pump against high temperature and seal leakage, a common pneumatic system of copper tubing and air supply connects all nine points of protection and one mercury switch in the auxiliary room responds to all of these points. A vibration switch on each engine comes into operation automatically after the engine converts to dual fuel operation. When the engine shuts down, a spring and lever arrangement recocks the vibration switch in case it tripped during shutdown. There are two three-way water temperature control valves on each unit. One valve maintains the jacket water temperature at 160° F. and the other valve keeps the turbocharger air in the manifold at a constant temperature of 100° F. Jacket water is cooled by a shell-and-tube heat exchanger in the products stream entering the station. About a third of the cooling water in the closed system is routed through the lube oil and turbocharger coolers and back into flow to jacket of engine.

There is a scraper detection unit in the main line permitting the pipeline scraper to bypass the station automatically. An incoming scraper triggers the controls so that the pumping units slow down while a bypass opens between suction and discharge lines. The station block gate opens and the suction valve closes. After passing the block gate, the scraper triggers a second detection unit causing the valves to become realigned to original operating position and the engines resume normal speed. Unit operation, valve lineup, unit electrical trouble, or mechanical trouble is indicated on a control panel located inside the control room. This board is duplicated at the master station at Port Arthur. The signals come in over the supervisory system and indicate operating information at each location. Signals come in over the company's own telephone system. Different signals can be sent simultaneously in both directions over a single wire. Should a storm knock down the telephone lines, the plant will continue operating automatically so long as nothing goes wrong, pending repairs on the line to Port Arthur. Should anything go wrong with an engine, pump or gear set, the complete pumping unit will close down and lock out until an attendant comes to the station and corrects the trouble. This occurs independently of the signal system to the master station. So long as there is no line trouble due to storms or other causes, the operator at Port Arthur can determine the cause of any trouble in either station as revealed on the telltale panel and can relay this information to the service man sent to the area having the trouble.

The Port Barre station is one of two completely automatic engine driven pumping stations on the Evangeline Products System. American Air Filter intake filters and Maxim silencers serve the three Nordberg Duafuel engines.

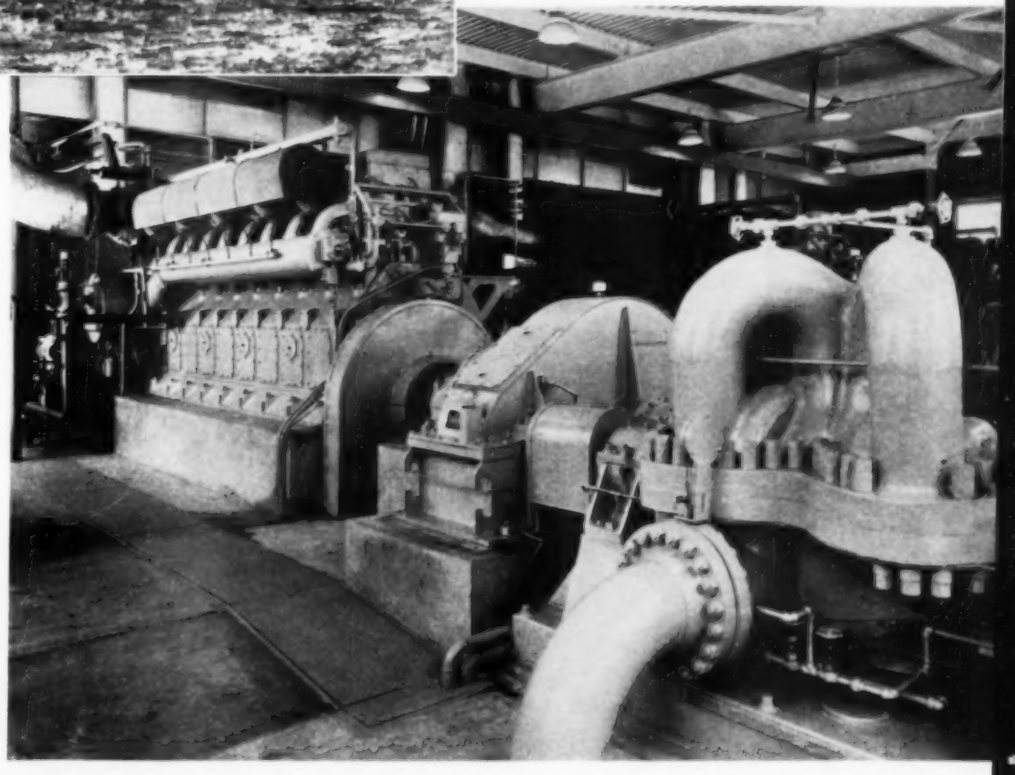


Equipment—Evangeline Products System

Main Engines	Nordberg Mfg. Company
Heat exchangers	Alco Products
Lube oil coolers	Young
Air filters	American Air Filter
Silencers	Maxim
Governors	Woodward
Lube oil filters	Commercial Filters
Pyrometers	Minneapolis-Honeywell
Start air compressor	Quincy
Emergency gen. unit	Buda–Allis Chalmers

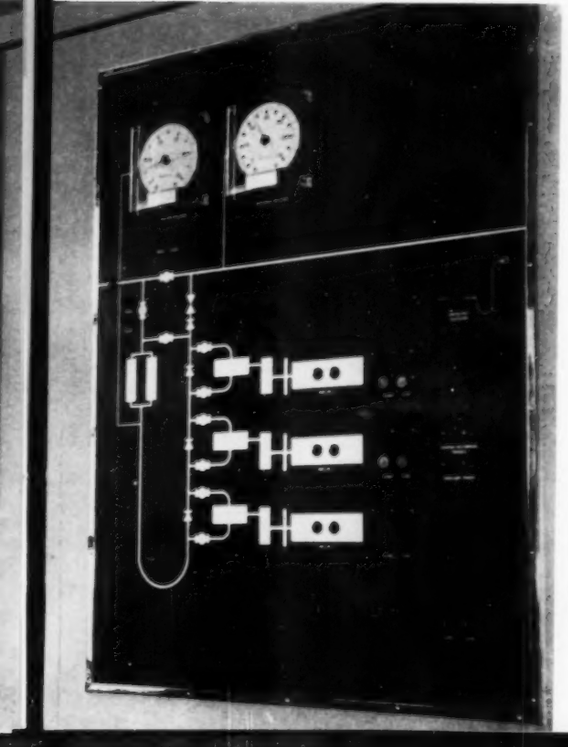
water, gas starting air and turbocharger air. It is equipped with exhaust temperature pyrometer. The main pumps and gear sets each have their own lubricating system including oil pumps, oil coolers and filters. Therefore, their operation is not affected by conditions prevailing within the driving unit. Electric power, however, is essential to plant operation. A major requirement is engine

Three Supairthermal Duafuel engines, each rated 1720 hp at 500 rpm, operate unattended in two of the satellite stations.



The stations at Port Barre and Jennings are steel structures with prefabricated framing and paneling insulated with fiber glass and covered inside with perforated acoustic board. They are permanent buildings and therefore built to the highest standards of quality. A single large engine room houses all three pumping units and has a gantry crane overhead for repair service. There are three other rooms. One of these houses the entire signal and control systems. In another there is a 50 kw emergency generating set and the third room is equipped for routine maintenance. The plant is surrounded by a high fence of galvanized link mesh. During periods when diesel fuel oil is being transported, liquid fuel is received from the main

Every function of satellite station is revealed on a panel through the use of a system of colored lights. Board is duplicated at master station at Port Arthur and operator there can exercise full push-button control.



line and stored in a 2000 bbl tank at the station. Pipelines, valves, heat exchangers, fuel storage tank, sump and sump pump, temporary jacket water storing and utility tank and the pump house for the well pump supplying plant water are all outside the main structure. The well water is treated before use as makeup.

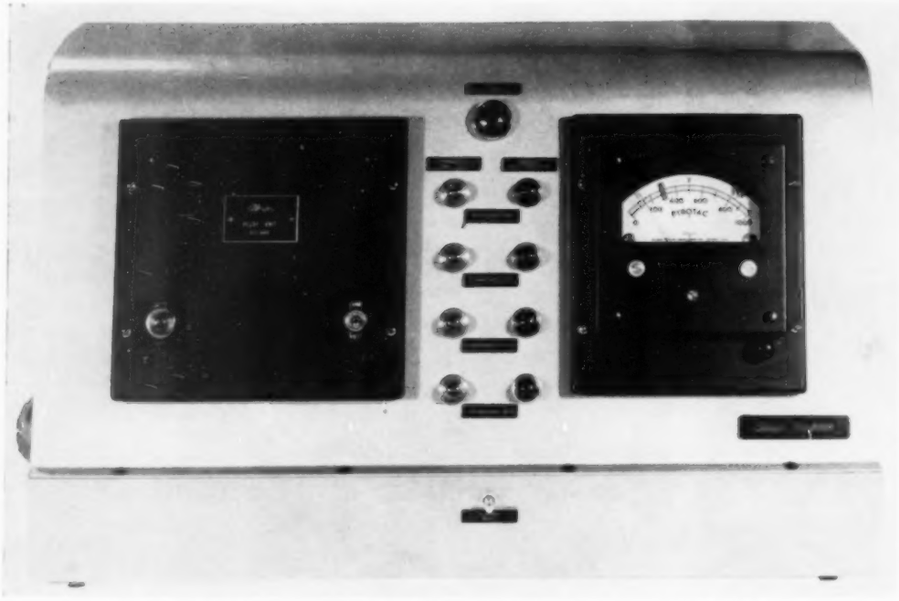
Since each of the Nordberg engines has its own oil and water pumps, it operates independently of an outside source of power once it is started and running. The before and after pumps act as standby units. There is an instrument panel for each engine with gauges showing the pressure on engine lube oil, turbocharger oil, fuel oil, jacket

room blower operation. If the ventilating system fails, the plant automatically shuts down and locks out because products pumped may be highly volatile and pump leakage could bring about an explosive mixture. Every precaution is taken to prevent explosion or fire. The Evangeline Products System is owned in undivided interest by Gulf Refining Company, Sinclair Pipe Line Company and The Texas Pipe Line Company and is operated by The Texas Pipe Line Company. The engine and pumping installation in the two new stations, their design, construction and method of operation are symbolic of the imaginative engineering and the advances made in recent years by the pipeline industry of the nation.

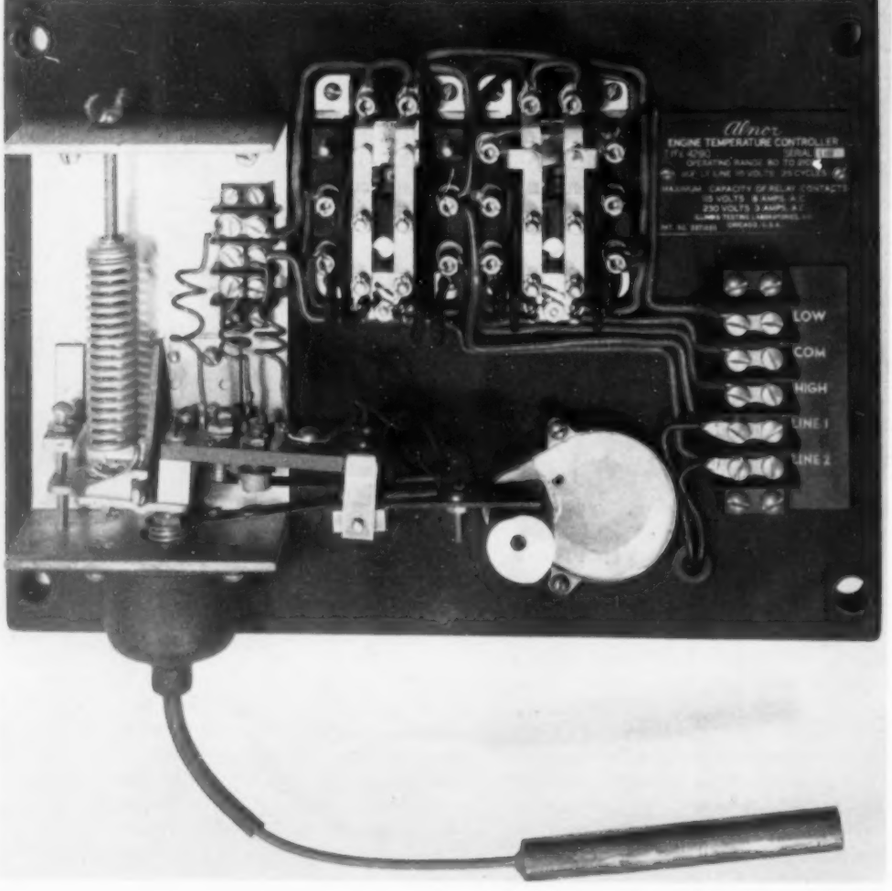
TEMPERATURE INSTRUMENTATION

A Step Toward Automation and Less Attendant Time.

By CHARLES O. WILSON*



Alnor Pyrotac and Sequential Relay switch for monitoring four zones with both alarm and shutdown mechanisms.



IN our economy one of the things we are accustomed to and proud of is change. The changing needs of one industry are reflected in several others—those who supply products and services. An engine or compressor can operate without attendants, provided that instrumentation is available to permit either automatic or remote operation and control. Those of us in the instrument industry who work closely with engine and compressor requirements, are aware of the increased number of installations being made which are more or less automatic or self operating. Some of the devices which help in reducing attendant time and assisting in remote operation are described in this article. The industry is widely familiar with pyrometers and thermocouples, especially as applied to exhaust temperature measurement. The basis of most of these newer instruments is this familiar pyrometer and thermocouple system. The thermocouple is a particularly versatile device. Its output is electrical in nature which is most convenient for use in automatic or telemetering circuits. The thermocouple may be made in a very large number of physical variations which make it easily adapted to uses in temperature measurement in such applications as bearings, cooling water, lubricating oil, exhaust gas, and temperature rise of motors, generators and valves.

The feedback from thermocouples is widely used in general industry to perform a variety of temperature control and low or high temperature protective functions. The instruments used with the thermocouple to accomplish these control and protective functions are also being put to good use by the engine and compressor industry. The Pyrotac is an example of an indicating pyrometer which is built with a simple, effective electrical circuit to sound an alarm and/or shut down when the temperature at the thermocouple reaches a predetermined setting. The shutdown or alarm temperature may be set at any point on the scale merely by setting the target in the desired position.

It may not be desirable to have one Pyrotac for every thermocouple so a switch is needed. A manual switch could be used as is the practice with indicating pyrometers, but to provide fully automatic protection a motor driven switch was needed and was promptly developed. Motor driven switches designed and built for this service have become very dependable and long lived equipment. They are quite compact and provide one very excellent means of watching several temperature zones. Another way of watching several temperatures has

Diesel or Gas engine air temperature controller.

*Engine Application Engineer, Illinois Testing Laboratories, Inc.

been developed. This involves a series of switches (one for each thermocouple) which operate one at a time in sequence. This is called the sequential relay and it does not have the motor and drive equipment involved, thus making sealing or gasketing much easier. There are applications where a sequential relay is easiest to apply. One reason is the need to have more than two sets of contacts on the switch. Two sets of contacts are needed to switch both the negative and positive sides of the thermocouple, and if the monitoring device has to switch some other circuits along with the thermocouples, additional contacts are needed. These additional contacts are easier to achieve with sequential relay system then with motor driven switch.

Explosion Proofing

The millivolt output of a thermocouple is at such a low potential that it can not become an explosion hazard, and since an indicating pyrometer has no external power requirement, it too is always safe. However, when a Pyrotac or Controller is introduced into the picture, the situation changes by virtue of the power requirement to operate switches, alarms, and shutdown devices. Contacts in such instruments may not be hermetically sealed to prevent explosions in dangerous locations. Therefore, the standard practice is to mount the instruments in explosion proof housings which confine any hazard to the inside of the housing itself. These housings are of necessity quite large, but the compact meter movements and simple electronic control circuits presently available keep these sizes to a minimum.

From our day to day work experiences with people in all phases of the engine and compressor industries we gain considerable information and feel for instrumentation which the industry will be seeking. Some of the things that are available, or can quickly be made available, are briefly described in the following paragraphs. All of these devices have to do with automatic operation of machinery or protection of the machinery when an operator is not present. The reduction of attendant labor cost is accomplished, which is one of the basic reasons for most instrumentation, and equipment operation is made more nearly automatic.

Remote Stepping Switches

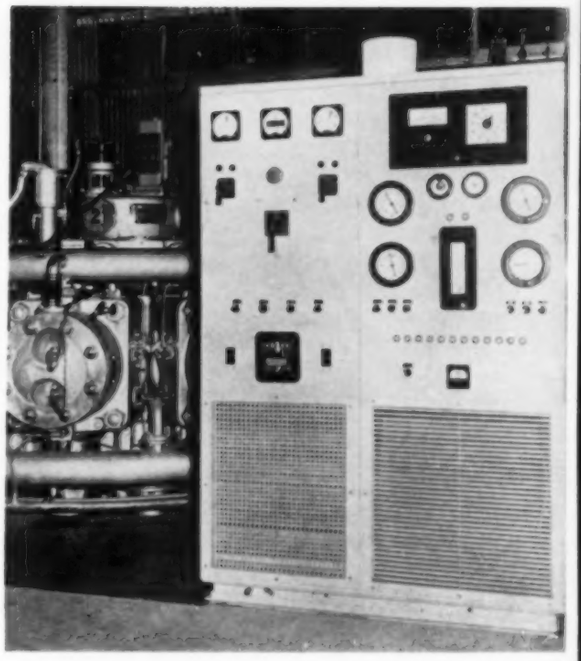
Several engines may be operated from one central control location, or at least machinery is operated when it is impractical to have someone in attendance. It would be the normal procedure to protect the equipment by means of a temperature scanner. However, if the scanner finds it necessary to shutdown or provide an alarm, this action would need to be transmitted to someone at the control point. Since, operating temperatures provide important information about the equipment condition, it may be desirable for the operator to be able to actually read these temperatures from time to time. A remote switch and read out could be provided which would allow the operator to watch whatever temperatures he chooses. Notice the minimizing of attendant labor at the actual engine site.

Controlling Scavenging or Intake Air

The volume of air needed by an engine for efficient combustion changes with load. It is conceivable to relate at least one operating temperature to load and thus use a temperature controller to operate a damper or a blower motor to correct the air intake. Devices have been supplied to control scavenging air in relation to load when the load is a generator. Here the means of sensing the load is logically, a measure of generator output. Of course, when the load is electrical, this can be used for other things such as turning additional generating units on as the load rises and turning them off as the peak passes and load begins to fall.

Compressor Valves

When unattended stations are involved, many temperatures may need to be monitored, such as pump and motor bearings, motor windings, lube oil and water and exhaust temperatures. Compressor valve temperatures provide an example of temperatures that can be profitably monitored whether the location is remote or not. When the discharge valve begins to leak appreciably, its temperature rises rapidly. This temperature rise may be detected in time to prevent a serious maintenance problem.

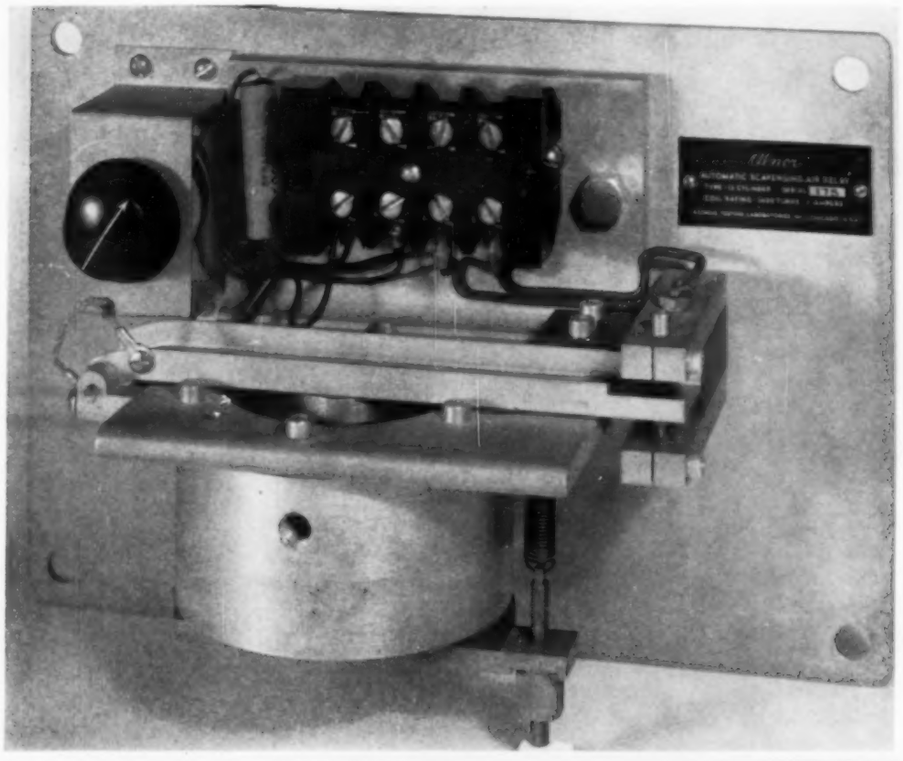


Large engine installation showing Alnor temperature monitor for eleven circuits. Note motor driven switch and temperature indicator in one unit.

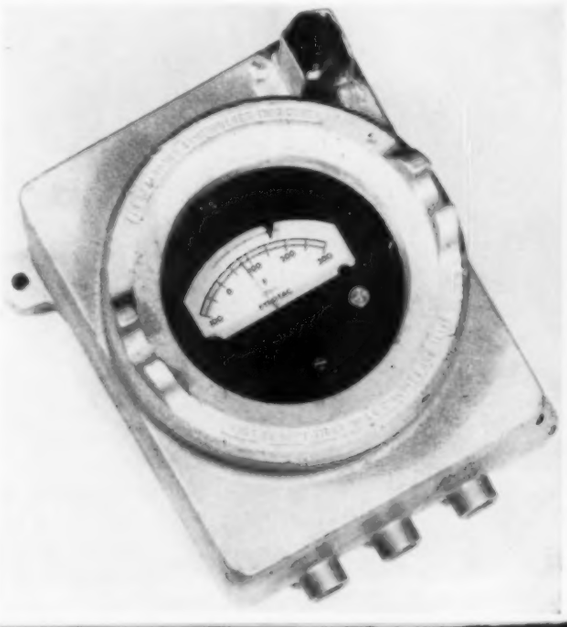
Telemetering Information

In all of these temperature measuring and control situations, telemetering of information can be accomplished. Once again the thermocouple output being electrical in nature (millivolts) proves to be most appropriate for telemetering. Pipeline companies find use of telemetering equipment useful for unattended booster stations along their line.

Automatic Alnor scavenging air relay.



Explosion proof housing with built-in Pyrotac for excess temperature alarm and or shutdown.



THAYER, MISSOURI

Missouri Municipality Cuts Fuel Cost 27 Percent. Plant Profits Reduce Town Taxes.

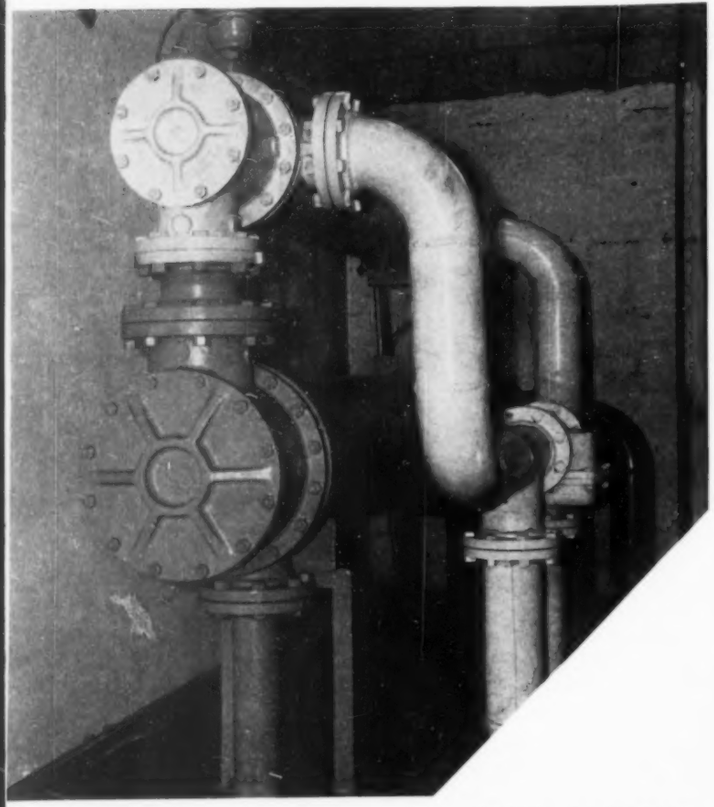
By W. L. BODE

A NEW Fairbanks-Morse opposed-piston diesel burning economical No. 5 fuel oil has cut fuel costs 27% in the municipal power plant at Thayer, Missouri. Profits from the plant pay a large portion of the expenses of non-revenue departments and keep taxes low. Thayer is a modest-size community of 1700 population just over the state line from Arkansas in the southeast sector of Missouri. Though its citizens still think of it as a "railroad town", the community today is primarily a trading and service center for a broad area. All light and power for Thayer is supplied by the municipal power plant equipped with five Fairbanks-Morse diesels and generators totaling 3305 hp and 2305 kw respectively. In addition to owning and operating this municipal power plant, the town has combined with it the water works and an ice plant which serves surrounding communities over a radius of 75 miles.

A major purpose in owning and operating these facilities is to make enough profit to help pay the town's operating expenses. Like many little municipalities in the middlewest, taxes would have to be high to support adequate civic services. If profit is to be made for the town, the plant must be run efficiently and economically, keeping labor force and other overhead to a minimum. That is being done under the able supervision of Mr. S. W. Wooldridge who heads all three departments and operates them as an integrated service. It was back in 1936 Thayer decided to produce its own power. At the time the Federal Government was making grants to municipalities that would establish and operate their own ice plants, and Thayer combined the two projects, raising its share of the cost by a bond issue. Two model 32 Fairbanks-Morse diesels rated 225 hp each at 300 rpm and two 150-kw F-M generators were purchased and in 1938 began supplying Thayer with low cost power. The plant has been paying dividends to Thayer, Missouri ever since.

By 1942, demand had outgrown supply and a 6-cylinder model 32 Fairbanks-Morse engine rated 450 hp driving a 300 kw generator was added. This initiated a practice of virtually doubling the capacity of the last installation each time more power was added. Accordingly, in 1948, a 7-cylinder model 33E-14 Fairbanks-Morse engine was ordered. This one was rated 805 hp at 300 rpm and turned a generator of 556 kw. Thayer hadn't experienced substantial population growth but more people were using more electric appliances and air conditioning of homes and stores became very popular, thereby increasing power demands. In 1956, to meet the growing demand, a 10-cylinder, 1600 hp model 38D8⅛ Fairbanks-Morse opposed-piston engine and an 1140 kw generator were installed, the newest and the largest of the plant's prime movers.

During the growth of the plant, none of the older engines was removed to make room for new ones for the very simple reason that they were good engines and generators that had performed well and could continue to carry their share of the load. No pistons or cylinder liners had worn out. Rings had given no trouble. To make room for the 1600 hp unit, a 40 x 60 ft extension was added to the power house along with new office space for Mr. Wooldridge. For this expansion of plant and facilities, B. L. Oliver & Company was engaged as consulting engineers. Installation of the opposed-piston engine opened two avenues to greater production economy. First, the new engine proved more efficient, raising output a full kilowatt-hour per gallon of fuel in spite of a relatively poor load factor. Second, the new diesel utilizes a cheaper fuel. Natural gas is not available and Thayer has had to be content to burn diesel fuel oil. Until

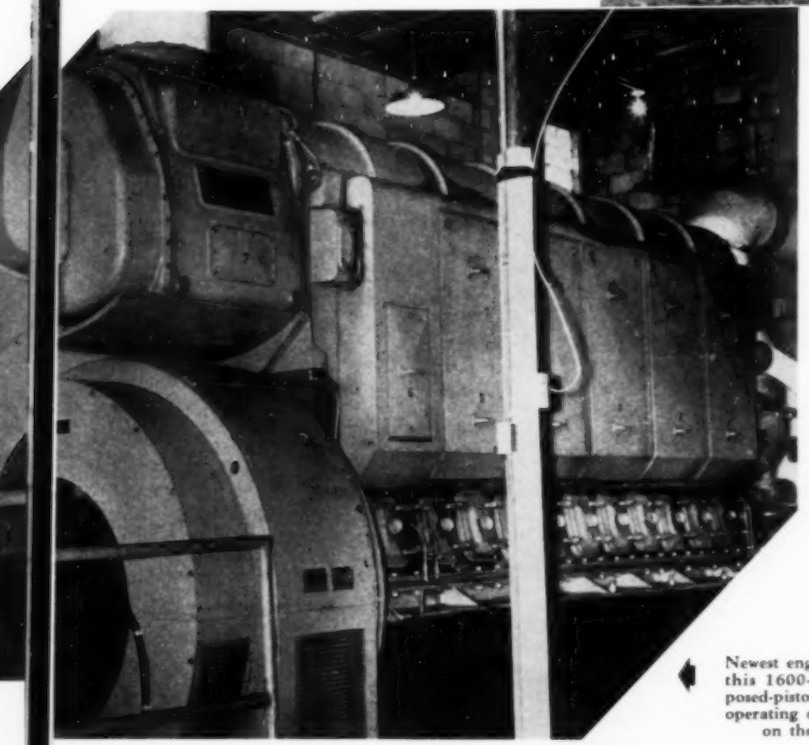


Jacket water and lubricating oil for the opposed-piston diesel are cooled in these Ross heat exchangers. An Amot thermostatically-controlled valve regulates temperature.

S. W. Wooldridge directs operation of the light, water and ice plants. Mr. Wooldridge has been associated with the power plant from the planning stage.

1956, the plant depended entirely on a No. 2 oil currently priced at 12 cents a gallon. With the installation of the O-P, however, it was decided to take advantage of the engine's proven ability to burn heavier fuel. Thayer chose a No. 5 oil available in good quantity at a price of 9.5 cents a gallon. A minimum of special equipment was required to permit use of the more viscous fuel. The storage tank for the No. 5 oil is equipped with a heating coil to keep the fuel fluid for flow to the plant. At the plant, the oil is cleaned in a centrifuge and then pumped into a day tank. This tank,

The Thayer, Mo., municipal power plant, where five Fairbanks-Morse diesels produce power at a profit sufficient to pay a large portion of the costs of city government and services.



Newest engine in the Thayer plant is this 1600-hp Fairbanks-Morse opposed-piston diesel which has been operating on No. 5 fuel since it went on the line in August 1956.

too, has a small heating coil near the outlet to keep the oil at free-flowing viscosity. The No. 5 fuel then is handled and injected by standard F-M pumps and nozzles. The engine runs with a jacket water temperature of 150 degrees.

No special operating or maintenance problems of any kind have been experienced because of the economy fuel. Lube oil consumption for the O-P is very low, averaging better than 12,000 rated horsepower hours per gallon. Though the new diesel has been the performance leader since going into service in August, 1956, every engine in the plant continues taking turns every other day at power generation and even the oldest 3-cylinder units do their share of the work. Like all the other Fairbanks-Morse engines installed at Thayer, there was no period of adjustment for the 1600 hp O-P. They just started it up, took things easy for a few days and that was all. All of the operation is simple easy procedure without fuss and feathers. There are four operating engineers, one on each 8-hour shift and one for the swing shift. They look after the power plant, the water works pumps and the ice plant. An extra man is hired during the summer to help with the ice. Although one man on a watch looks after five engines, the water system and the refrigerating plant, everything is clean and shipshape all the time.

Good operating practice was established at the beginning and has been carried out ever since. All of the engines have closed cooling systems and towers to cool the raw water. The oil is by-passed through filters. The engines have attached pumps and standby motor-driven pumps provide emergency service for water and oil. With the addition of the new engine, a new cooling tower was built, new heat exchangers were installed and a new compressor and starting air tank were put in. It was necessary to add new panels to the switchboard and of course provision had to be made for the use of cheaper fuel separate from the fuel supply for the older engines. All of this has been done neatly and effectively. Relatively small space has been utilized to best advantage. The Fairbanks-Morse diesels are overhauled each 8000 hours of operation and when it comes time to work on an engine, one of the engineers comes in on his day off and is paid overtime to help out. This eliminates the use of outside help on maintenance.

This has been a productive and profitable plant for Thayer. In addition to an output of 3,500,000 kilowatt hours by the power plant's diesels, the water pumps delivered 94,594,000 gallons of city water in 1956, and the ice plant put out 6,825 cakes of ice, a total of 1,028 tons for the year. The electric plant charges nothing for current to run the refrigerating machines, water pumps, or to provide current for street lighting and other town services. Still, the plant nets a handsome profit, more than $85,000 in 1956. Usually the diesels are paid for by plant revenue bond issues but in one instance solvent Thayer paid cash on the barrel head. Mr. Wooldridge has been working for the town 30 years and has been with the power plant since the planning stage. Administrations change, but not Superintendent Wooldridge, who knows every piece of machinery and every nut and bolt in the power house. If better results can be had, he will get them with his Fairbanks-Morse engines, generators and pumps. With his new engine turning out power efficiently on economy fuel, he is confident the plant will continue making enough profit to pay Thayer's municipal expenses.

Equipment List, Thayer, Mo.

Engines	Fairbanks, Morse
Generators	Fairbanks, Morse
Pumps	Fairbanks, Morse
Oil filters	Hilco
Silencers	Maxim
Heat Exchangers	Ross
Air Compressor	Gardner-Denver
Centrifuge	De Laval
Temperature control	Amot
Pyrometer	Alnor
Governors	Woodward
Air filter	Air-Maze
Gauge panel	Westinghouse

USE OF RESIDUAL OIL AS DIESEL FUEL

This is Chapter Three of This Paper. Chapter One Appeared in our December, 1957 Issue, and Chapter Two in the January, 1958 Issue. Reprints Will Be Available From The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

By EDWARD B. RAWLINS*

IF combustion is complete and all fuel is burned, the dry ash resulting will pass out the exhaust without depositing on the valves. The actual time from the beginning of injection until the combustion process is completed in the average 327 rpm engine is about .075 of a second. Any factor that contributes to the delay of the combustion process obviously causes incomplete combustion with a resultant dirty exhaust and poor operation. Referring once again to fuel temperature, incomplete combustion can be caused by ignition delay or the time it takes for the fuel to start burning after it enters the cylinder. Low fuel temperature affects ignition delay since the colder the fuel the more time is required to pick up heat from the heat of compression and begin the burning cycle.

By the same token, the more heat put into the fuel from the outside, the more volatile the fuel becomes and less time will be required for the fuel to pick up the required amount of heat to start the burning process. Experience has shown that the temperature to which a fuel is heated before it is fed to the engine is of great importance, this importance being two fold– (1) To reduce the viscosity to assist in getting the best atomization possible and (2) to increase the volatility of the fuel and reduce the time required to start the burning cycle. This latter in effect amounts to an improvement in the apparent cetane of the fuel.

It has been observed that an engine in operation will be running with an apparently clean exhaust and yet have a tendency to foul up the exhaust valves. A close observation of the exhaust will disclose a slightly dark ash coming from the stack, which a 10° or 15°f increase in the fuel temperature will turn to a completely burned light ash with a consequent reduction in valve deposits. To the casual observer, the appearance of the exhaust would be the same in either case. This discussion brings up the question of Cetane value which often arises in heavy fuel discussions. Cetane being a measure of the ignition delay or ignition quality of a fuel is important only when there is no way to compensate for the delay. Since it is possible to reduce ignition delay to a satisfactory level by means of temperature, the Cetane value of a residual is of relatively little importance. In fact, the writer knows of no method by which a Cetane rating of a residual fuel can be obtained. There is no motor method set-up for evaluating residual fuels. The calculated method is not adaptable because of the requirement of a mid-distillation point.

FUEL ADDITIVES–Additives have been available on the market for several years for use in the treatment of residual fuels to improve their stability and combustion properties. While the value of the various additives has often been debated, the writer has observed their use on different occasions and is of the opinion that they have a very definite

*Engineer–Fuels and lubricants, The Cooper-Bessemer Corporation

Figure 12—
Same specimen as Figure 11 but etched and magnified 250 times.

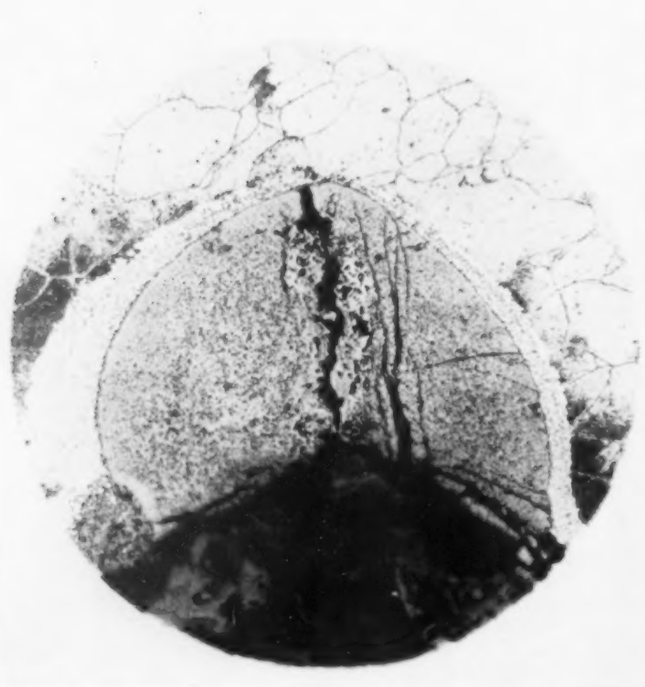


Figure 13—
Photomicrograph of a section through the seat of the light colored valve Figure 7. Unetched and magnified 100 times.

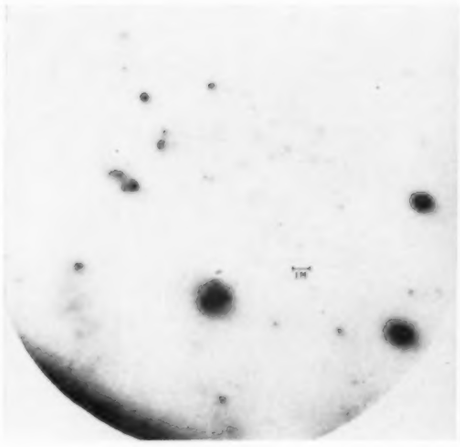


Figure 15-4A

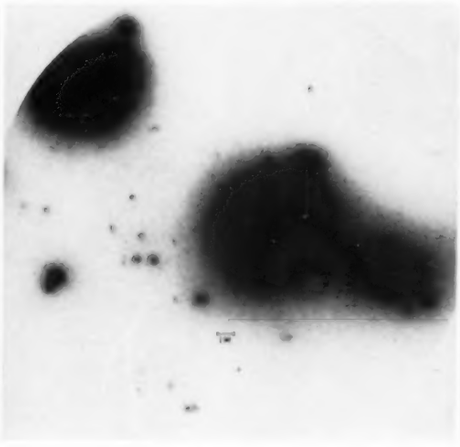


Figure 15-4B

Figure 15-4C

place in the residual fuel picture. Most of them act as sludge solvents and dispersants. In addition to these properties, some of them also have combustion catalysts incorporated in them. They have a way of breaking up sludge and agglomerates and dispersing them as sub-micronic particles throughout fuel. Even water, if present in small quantities, is finely dispersed and passes harmlessly through the system with the fuel. To illustrate the effect and dispersing power of the proper additives when properly applied, see Figures 15-4A, 15-4B, 15-4C, 16-6A, 16-6B and 16-6C. Figure 15-4A is an electron microscope photograph, at 6750 diameters, of a typical No. 4 fuel as received from the supplier. Figure 15-4B shows this same fuel after it has aged for a short time (in this case about 2 weeks) and figure 15-4C is the aged fuel after treatment with a dispersant additive. Figures 16-6A, 16-6B and 16-6C illustrate a typical No. 6 fuel under the same conditions of handling and treatment. Under the "A" figures, the fuel shows a dispersion of agglomerates varying in size from submicronic to a few microns in size. The "B" figures show what happens to an unstable fuel after it has been in storage a short while. The oxidation products as illustrated by dark spots or areas have increased and coalesced forming much larger agglomerates. "C" figures show the fuel after treatment with the agglomerates broken up to sub-micronic size and dispersed through the fuel.

The heavy agglomerates shown in the "B" figures are heavy tar like polymers, the result from oxidation and disintegration of the fuel. They are very slow burning and in the combustion process do not completely burn to an ash because of the short burning period. The result is fouled injection nozzles, combustion chamber deposits, valve deposits, and smoky exhaust. Varnish deposits in fuel pumps and injectors also result from these oxidized products. The dispersion of these products in finely divided particles, due to treatment, permits their complete burning and as a result a clean engine. The proper use of additives is important. They must be added in the proper manner and in proper quantity. Different fuels require different quantities of additive to do the job. For example, one fuel might require 200 ppm of additive for proper treatment, another 800 ppm, while still another might require 1200 or more ppm. The fuels illustrated required 1500 ppm to disperse the agglomerates. The addition of additives in greater or less quantities than required usually results in little or no improvement in the fuel and in some cases may aggravate the condition in the fuel rather than improve it. So far as is known today, there is only one way of determining whether or not the fuel has been properly treated and that is by means of the electron miscroscope for ascertaining dispersion and particle size. Many times where additives have been tried and condemned they were condemned due to no fault of the additive but rather due to misapplication. As fuels get heavier and poorer and as additives are developed and improved, additives undoubtedly play an increasing role in the use of residuals as diesel fuels. They cannot only help in the power cylinders, but also can reduce fuel filter and fuel injection system maintenance. The use of additives is not confined to residual fuels but they can also be used to improve the performance of distillate and cracked fuels. Many of our modern distillates and distillate-cracked blends are very unstable. It is with these unstable products that additives can be used to advantage.

COMPATABILITY: While the writer has never experienced a serious case of incompatability of residual fuels, such incompatability is known to exist. Little can be done in the purchase of residual fuels to assure one that the fuels being purchased will be compatable. Refining processes, crude sources, and handling and storage have an effect on how a fuel will behave when it is mixed with another. The writer knows of one case in which two fuels, each in themselves good fuels and

Figures 4 through 14 are all from one installation. These valves were destroyed by burning which was initiated by excessive deposits, on the face of the valve and valve seat, holding the valve off its seat and permitting the combustion gases to blow through. These deposits were principally calcium oxide with very little vanadium and sodium being present.

Figure 14—
Specimen in Figure 13 etched and magnified 250 times. Note the intergranular attack which may be oxidation or corrosion.

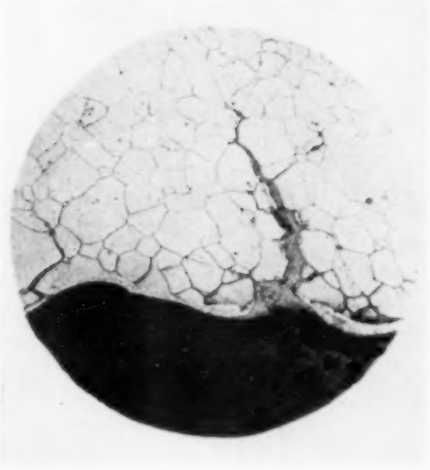


Figure 16-6A

very low in contaminants, when mixed became heavy with sludge. In fact, the mixture was so difficult to process for use in the diesels that its use was given up and the fuel used up in the boiler of the plant and with some difficulty. Incompatability is always a possibility but it is not confined to residuals alone for the lighter grades of diesel fuels are also subject to the same troubles. There is no particular reason why problems of compatability should bother the user of residuals for diesel engine fuels since, while it is always a threat, the same threat exists with other fuels. If two incompatable fuels do get together, additives can be used to disperse the sludge and stabilize the fuel.

LUBRICATION: The lubrication of diesel engines burning residual fuels should present no problems since under proper operating conditions and proper handling of the fuel, and engine operating on residual fuel should be no dirtier than one operating on conventional fuels. If there is excessive contamination of the lubricating oil, it is probably due to faulty combustion or poor maintenance of the engine or injection system. A heavy duty detergent lubricating oil should be used and with adequate maintenance and filtration should maintain a clean engine and give good lubricating oil consumption. Little more need be said of lubrication than, given the chance, modern heavy duty lubricants will more than pay for their extra cost in lower maintenance, a cleaner engine and better lubricating oil consumption.

SUMMARY: The operation of diesel engines on residual fuels presents no problems that cannot be solved by the use of good operating practices. It is only necessary to insure that the fuel is properly cleaned, heated up to a temperature that will reduce it to the proper viscosity and let the engine do the rest. Proper and fine atomization may require that some change be made in the nozzle tips, that is, smaller orifices may be necessary to obtain optimum results. Regular inspections of all fuel lines and connections are necessary to catch leaks, should they occur, which if not taken care of could contaminate the lubricating oil and at best make a dirty looking piece of equipment out of the engine. Residual fuels are dirty and messy to handle. Operating personnel doesn't particularly like them. The great savings made possible by their use, however, more than compensates for the extra care.

All things being equal maintenance of engines operating on residual fuels should be no greater and wear no more than on any other fuel. As more installations are made, better knowledge of how to use and handle the various fuels and better operation of the engines themselves is obtained. It is true that in the broad sense there is a great deal to learn about residuals and their behavior in an engine. Each day new problems add to the store of information about residual fuels and from their solution gain the information that will enable us to operate those smaller, higher speed engines that many feel are out of the heavy fuel picture. The diesel engine operating on residual fuel has a definite place in the economical production power.

Figure 16-6C

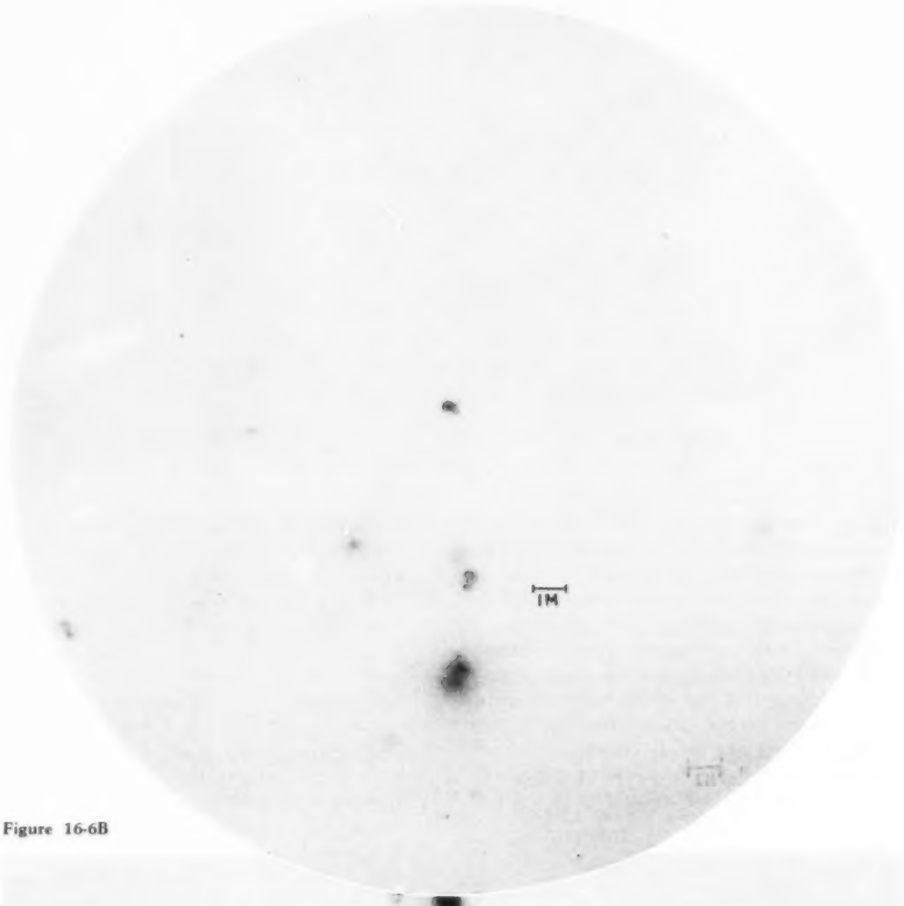
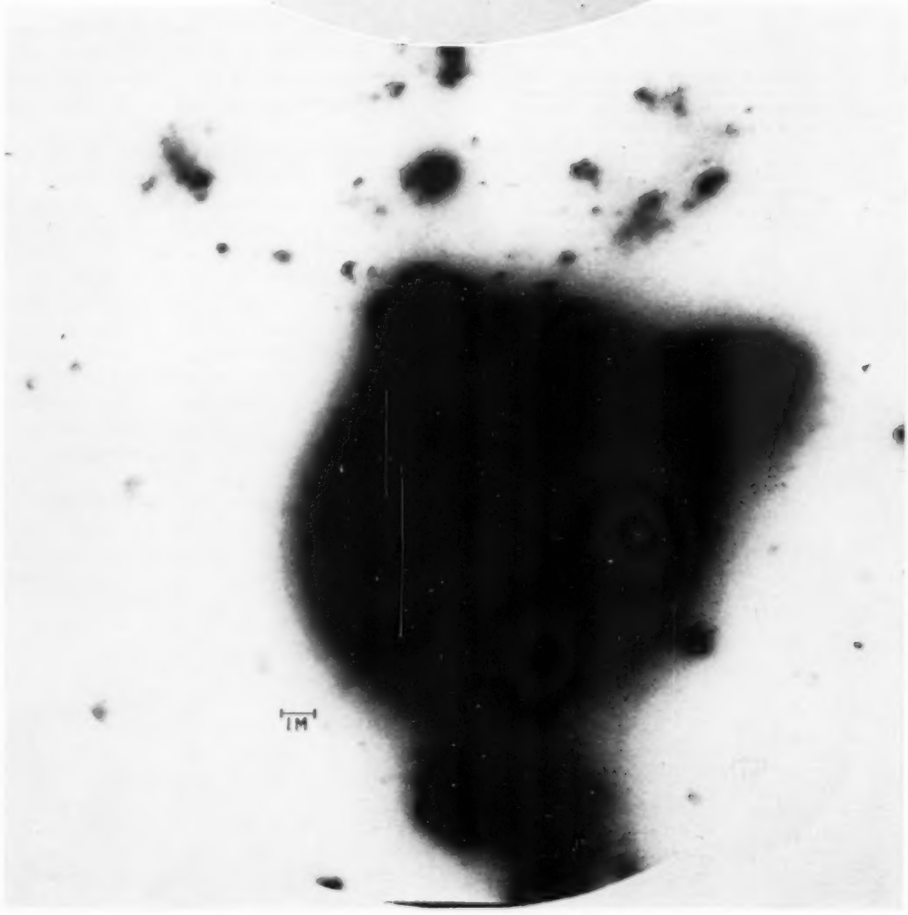
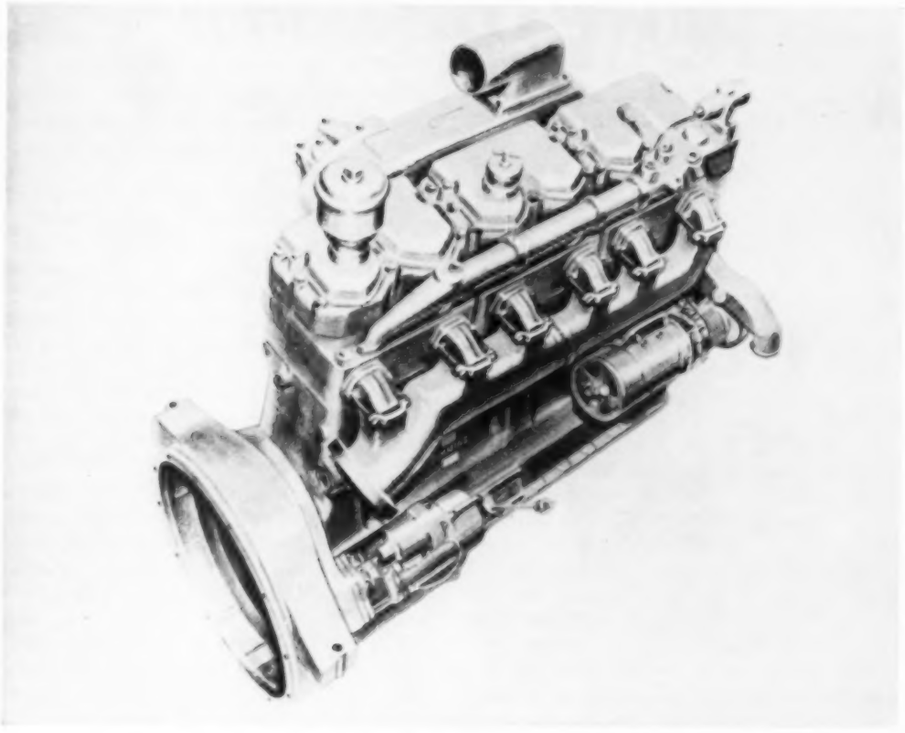


Figure 16-6B



NEW CUMMINS TRUCK DIESEL

THE Cummins HF-6-B, a 180 hp diesel designed for long life in heavy-duty trucking service, has been announced by Cummins Engine Company, Inc. This model has been developed from the components of the Cummins NH diesel. The HF is specifically designed to meet the needs of truck operators in the Midwest, East and South where there is vast potential for the increased use of diesels in trucking operations of all types. With the major components of the well-known 200-335 hp NH series, the HF offers users a new engine with many major parts proved dependable through years of service in the NH engines. The NH crankshaft, block, connecting rod, piston pins, bearings, valves and cylinder heads have been incorporated in the HF-6.



The new Cummins 180 hp HF-6-B truck diesel.

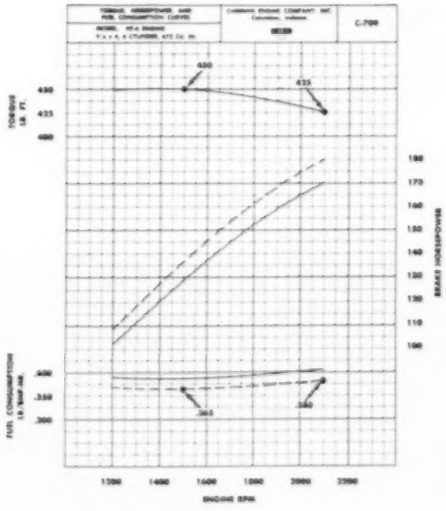
HF-6 HORSEPOWER, TORQUE & FUEL CONSUMPTION

(Preliminary)

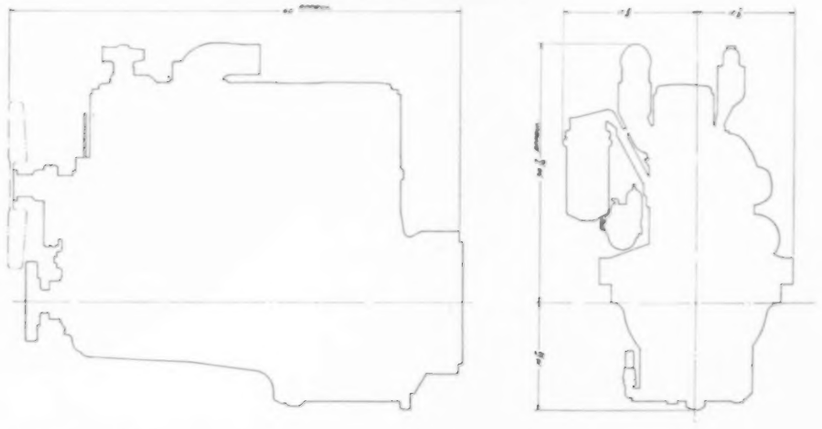
Solid curves represent performance of engines at 1000 feet altitude and 90° Fahrenheit intake air temperature. Engines should be derated 3% for each 1000 feet altitude above 1000 feet and 1% for each 10° temperature above 90° Dotted curves show horsepower and fuel consumption curves corrected to 29.92 inches of mercury (sea level) barometric pressure and 60° Fahrenheit intake air temperature.

Horsepower and torque curves represent gross power available with water pump, oil pump, fuel system and air cleaner but do not include battery charging generator, compressor, fan and optional equipment. Fuel consumption curve represents the fuel rate when engine is developing maximum power.

Horsepower and torque curves show performance obtained when operating on No. 2 diesel or furnace oil. Equivalent results can be obtained with lighter No. 1 fuels or heavier No. 3 fuels by a simple adjustment and recalibration of the fuel pump.



OVERALL DIMENSIONS



The HF engine, when developing maximum horsepower, has a lower exhaust temperature than any other Cummins diesel in its horsepower range. Also a glance at the accompanying power curves shows that this engine has a very respectable fuel consumption curve, which is very important in a truck operation where operating costs must be kept to an absolute minimum to assure success in the highly competitive transportation industry of today. Cummins' replaceable, wet type cylinder liners are standard equipment as well as a four valve cylinder head, which gives superior breathing for maximum performance and fuel economy. Low initial cost for trucks is made possible with this new engine because its torque characteristics permit the use of low cost transmissions and drivelines. The HF-6 has a fully counterbalanced 4½ in. diameter crankshaft, a total main bearing area of 61.15 sq in., open type combustion chamber, dual intake and exhaust valves, roller type cam followers, and simple flyweight type governor. The engine has a bore of 4⅞ in. and a stroke of 6 in., six cylinders, and a piston displacement of 672 cu in. It attains its rated 180 hp at 2100 rpm and it weighs approximately 2400 lbs with standard accessories.

Truck manufacturers announced the availability of the Cummins HF diesel in January, and the engine has been in production since November 15, 1957.

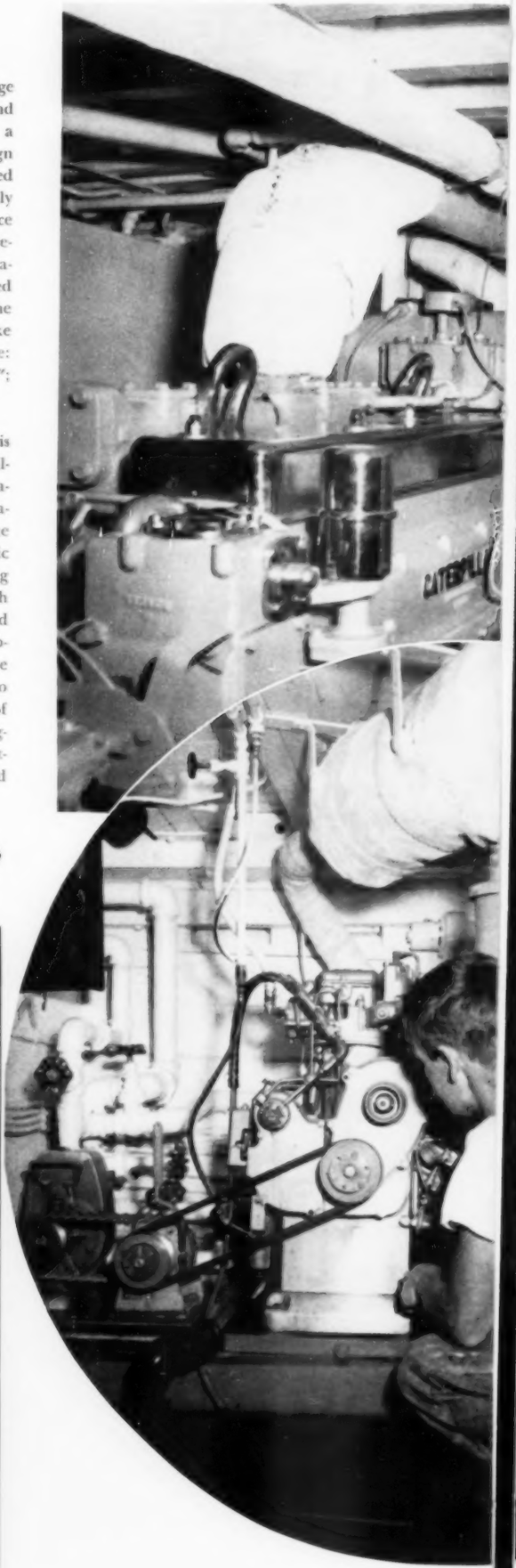
Power curves and dimensions of this new truck diesel designed especially to meet the needs of truck operators in the Midwest, East and South.

M/V *PATHFINDER*

AN essential part of a marine laboratory is the floating equipment from which observations are made at sea. Much can be accomplished from shore, from piers, and from small boats in protected waters, but for a well-balanced program a seaworthy vessel, adequately laid out and equipped, is a necessity. Research vessels are expensive to build, to equip, to maintain and to operate, and many laboratories have found it necessary to compromise by converting an existing vessel to their purpose. Thus it is unique and newsworthy when a vessel is designed and built especially for research. Such a vessel was proudly put into service by the Virginia Fisheries Laboratory in 1957. Designed by George E. Meese, Naval Architect of Annapolis, Maryland, and built by Curtis-Dunn Marine Industries, Inc. of West Norfolk, Virginia, she was named *Pathfinder*, in honor of Matthew Fontaine Maury, Virginia's distinguished citizen, and America's first oceanographer. The name is doubly appropriate, for it also describes the exploratory nature of the work in which the *Pathfinder* will be engaged.

Several considerations dictated the size and characteristics of the *Pathfinder*. Because she must withstand the violent storms that sometimes sweep Chesapeake Bay, and must be capable of operating in the open sea, she must be as large and seaworthy as budget limitations would permit. On the other hand, since she must operate in the Bay and estuaries, where the water is quite shallow, she should not draw more water than consistent with length and seaworthiness. She should have a large area of unrestricted deck space for handling nets and oceanographic instruments and gear, yet should contain adequate laboratory and storage space and comfortable quarters for crew. The end result was a vessel that superficially resembles a shrimp trawler, but departs from trawler design in several important ways. The engine was placed as far aft as possible, to occupy the space normally used to hold the catch. This allowed more space forward for living quarters and galley, and released space in the deckhouse for use as a laboratory. Maximum space within the hull was obtained by the use of steam-bent frames in place of the sawn-frame construction typical of Chesapeake fishing boats. The dimensions of the vessel are: length overall, 55′-3″; length on waterline, 51′-8″; beam, 16′-8″; and draft, 5′-0″.

The *Pathfinder* is also unique in that her crew is composed entirely of biologists. The captain, William H. Massmann, holds an M.A. degree in Marine Biology, and gained his skipper's qualifications as mate on a seagoing Army tug during the last war. The crew is selected from the scientific staff of the Virginia Fisheries Laboratory according to the nature of the work to be done on each cruise. At present the vessel is primarily engaged in surveys of Chesapeake Bay and its major tributaries to measure the distribution and abundance of fishes and other migratory marine animals, to study their movements and estimate the catch of the various commercial and sport fisheries by tagging, to estimate the success of spawning and attempt to predict the future supply. It is planned



Onan diesel generator, Surrette batteries, control panel and Constavolt converter on left.

to broaden the program in future, to investigate the effects of oceanic currents upon the survival of young fishes and their movements from the ocean spawning grounds to nursery grounds in the Bay and estuaries.

The engine room contains the Caterpillar diesel engine, model D-326, and Twin Disc hydro-troll marine gear, with 2.96:1 reduction gear ratio. The hydro-troll device permits bleeding off a portion of the hydraulic fluid, causing the gear to slip, and permitting an additional reduction of approximately 2:1 in shaft speed for slow-speed hauling of nets and scientific gear. The auxiliary generator is an Onan diesel, 32 volt, 3000 watt capacity; the electric system is 32 volt. Power is stored by two sets of Surrette batteries, each of 16 cells. A Constavolt marine converter transforms 115 volt shore power to 32 volts when the vessel is docked. The main engine drives a Jabsco 1¼ inch bilge pump, and a 1¼ inch salt water service pump. The pilot house is provided with engine controls and an instrument panel with gages for clutch oil and lubricating oil pressure, hydraulic oil and water temperature, ammeter, and tachometer. The compass is a Kelvin-White Constellation, 8-inch spherical, with binnacle. Electronic equipment includes a Bendix Skipper Radio-telephone, Bendix Depth Recorder DR-16, with ranges 0-50, 50-100, and 100-150 feet, and Bendix 530/600 DX-L, radio direction finder. The matched 5½-inch barometer and 8-day clock are by Chelsea. A One-Mile-Ray searchlight; a Federal Sign and Signal Corp. horn; a Perko bronze bell; a Kelvin-White Constellation, 4-inch spherical compass, with binnacle; engine-room controls; and a steering wheel; are located on the flying bridge.

The laboratory has a biology bench with Willis stainless steel sink, and a chemical bench topped with lead and containing a specially-built lead sink, on the starboard side. Running salt water, and hot and cold fresh water are piped to the sinks, and lockers and drawers are provided below. On the port side is a work bench with lockers and drawers below, and an 8-cubic-foot freezer, specially built by the Mechanical Engineering Corporation of Norfolk. Laboratory benches and deck are covered with Armstrong inlaid linoleum.

On the main deck forward is an Atlas Anchor Windlass, with ¾ hp electric motor, chain wildcat, and rope gypsy. Access to the chain locker is provided by a Wilcox-Crittenden steel manhole with grating. The 85-pound and 40-pound Danforth anchors are stowed in chocks on either side of the windlass. Just forward of the wheelhouse is a skylight and access hatch to the focsle. On the afterdeck is a Hathaway trawling winch, with two drums, each containing 1000 feet of 5/8-inch plow-steel wire, and gypsy. Power from the main engine is provided by Vickers hydraulic equipment. A flush hatch gives access to the engine room, and a smaller hatch aft leads to the lazarette. On the port side, intake and discharge pipes for the Barnes plankton pump project through the deck. Exhausts from the main engine and auxiliary are serviced by Maxim silencers.

All hatches, doors, windows, portholes, exhaust vents, and funnels, except the wheelhouse doors and windows are provided with bronze screens. Most of the equipment and fittings were supplied by the Paxton Company, of Norfolk, Virginia.

Caterpillar D-326 main engine.

Electronic equipment in pilot house.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

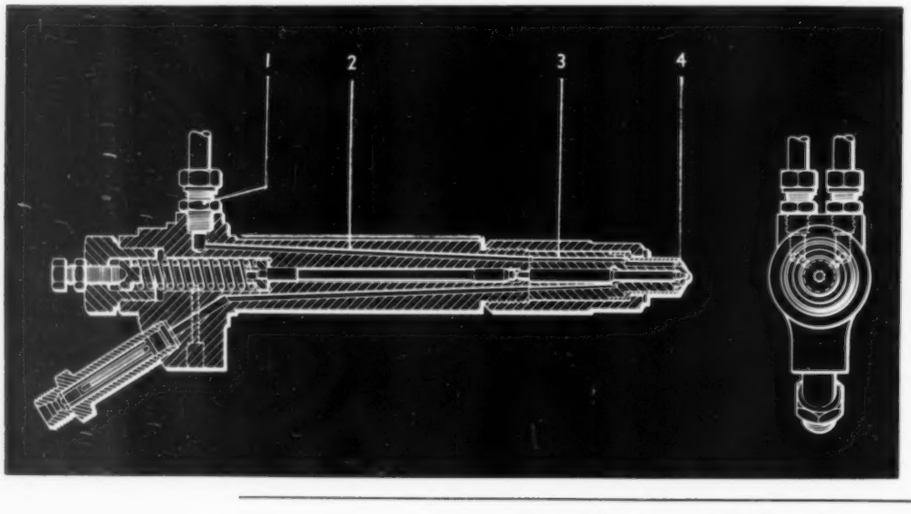
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now specializing in industrial advertising with Roles & Parker, Ltd. in London.

C.A.V. Water-Cooled Injectors

The need, in some diesel engines, for water-cooled injector nozzles and nozzle holders, has led C.A.V. Ltd., of Acton to produce a new design of injector details of which are seen in the accompanying drawing. Two special couplings (1) on the nozzle holder lead to two ducts (2) drilled in the holder.

These connect with two similar longitudinal ducts (3) in the nozzle, each of which eventually branches off in a helix that leads into a cooling annulus (4) situated near the nozzle tip. The nozzle is located on the holder in the normal way, by two dowels, to ensure that it is fitted correctly and that the cooling ducts in the nozzle and holder coincide.

Cooling water, piped into the nozzle assembly through one coupling and out through the other, passes through the annulus and cools the nozzle tip. The system is designed for a flow of cooling water of up to 60 gallons per hour and, as a protection against the corrosive action of the water, cooling ducts in injector nozzle are nickel-plated.

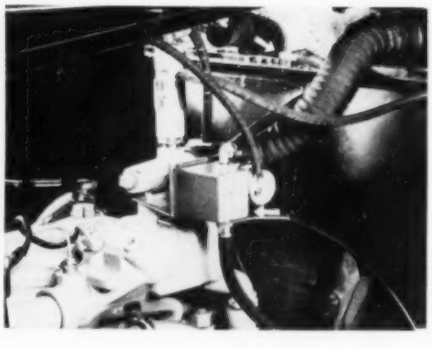


Pressurized Cooling On Leyland Engines

A pressurized cooling system has been introduced by Leyland Motors Ltd. for its home and export range of Royal Tiger Worldmaster passenger vehicles. In the near future, all production chassis of this type, which are powered by an underfloor engine, will incorporate the new system as well as a re-arrangement in the water circulation which, according to tests, results in a slightly lower consumption of engine lubricating oil, enhances engine life and prevents loss of coolant even at high temperatures. The new system, which works at a pressure of 4 lb per sq in., eliminates the need for the large header tank previously used on these models, but includes an expansion tank that collects water ejected from the system through expansion of the coolant at high temperatures. The thermostat will open at 165°F. instead of 185°F. as before. Under the new arrangement, a valve below the sealed filler cap opens when the pressure of the coolant exceeds 4 lb per sq in., the surplus coolant being piped to the expansion tank which is mounted on the chassis frame. This tank has a capacity of approximately one-tenth the total capacity of the cooling system. When the temperature of the engine coolant falls with the resultant contraction of the liquid, a second valve opens allowing the surplus coolant in the expansion tank to be syphoned back into the cooling system. By conserving the water supply and keeping the cooling system topped up, this arrangement consequently prevents the loss of any antifreeze mixture which may be mixed with the water.

Low Water Alarm For Diesels

A device developed and manufactured in Portland, Oregon has been engineered to give an alarm to the operators of trucks, tractors and other heavy diesel-powered equipment, warning them that water is low before the engine registers any heat. Manufactured under the trade name *Water-larm*, the unit has undergone extensive fleet tests, resulting in substantial reduction in repairs and down-time due to failures attributable to loss of coolant, according to the manufacturer. This instrument warns the driver or maintenance man if water is low, regardless of whether the motor is off, operating cold or hot, and in plenty of time for him to prevent damage. It also registers a warning if water is suddenly lost from a broken hose. Developed by the Water-larm Corporation of 404 S. E. 202nd Street, Portland, the device consists of a unit installed on the coolant system and is manufactured of all brass, aluminum and stainless steel. When water drops to the level selected at time of installation, the unit sucks air, switching on a red warning light on the dashboard. Of rugged construction, the unit is designed for lifetime service in trucks, tractors, road equipment, stationary and marine engines. Write Water-larm Corporation for more information. (ITS NEW)



DIESELS REPLACE STEAM, INCREASE TONNAGE, REDUCE COSTS ON DREDGING JOB

By R. E. DANIEL*

OF recent years many sand and gravel contractors found it necessary to augment dredging facilities as a means of increasing tonnage to meet demands, and to reduce operating and overall maintenance costs. That was the problem confronting J. K. Davison & Brother, New Kensington, Pennsylvania river contractor prior to March of '55. For years the company dredged along a 6 mile strip on the Allegheny river just outside the town. Steam supplied the power in what had been a profitable operation. But in the years following the war, increased demands for sand and gravel far surpassed the company's production capacity with equipment which had already seen better days. Company engineers surveyed the problem and put into effect a project designed to increase tonnage and greatly reduce operating costs which had been steadily climbing.

To satisfy the need for up-to-date equipment in keeping with the company's aim toward increased monthly tonnage, the company installed two, Superior model 40 SX-8 diesel engines on their dredge. Manufactured in the plant of White Diesel Engine Division of the White Motor Company, Springfield, Ohio, the two Superiors have an 8½ inch bore, 10½ inch stroke, and are rated 785 hp at 900 rpm, 155 bmep. Engine equipment includes heat exchangers, air filters and exhaust silencers.

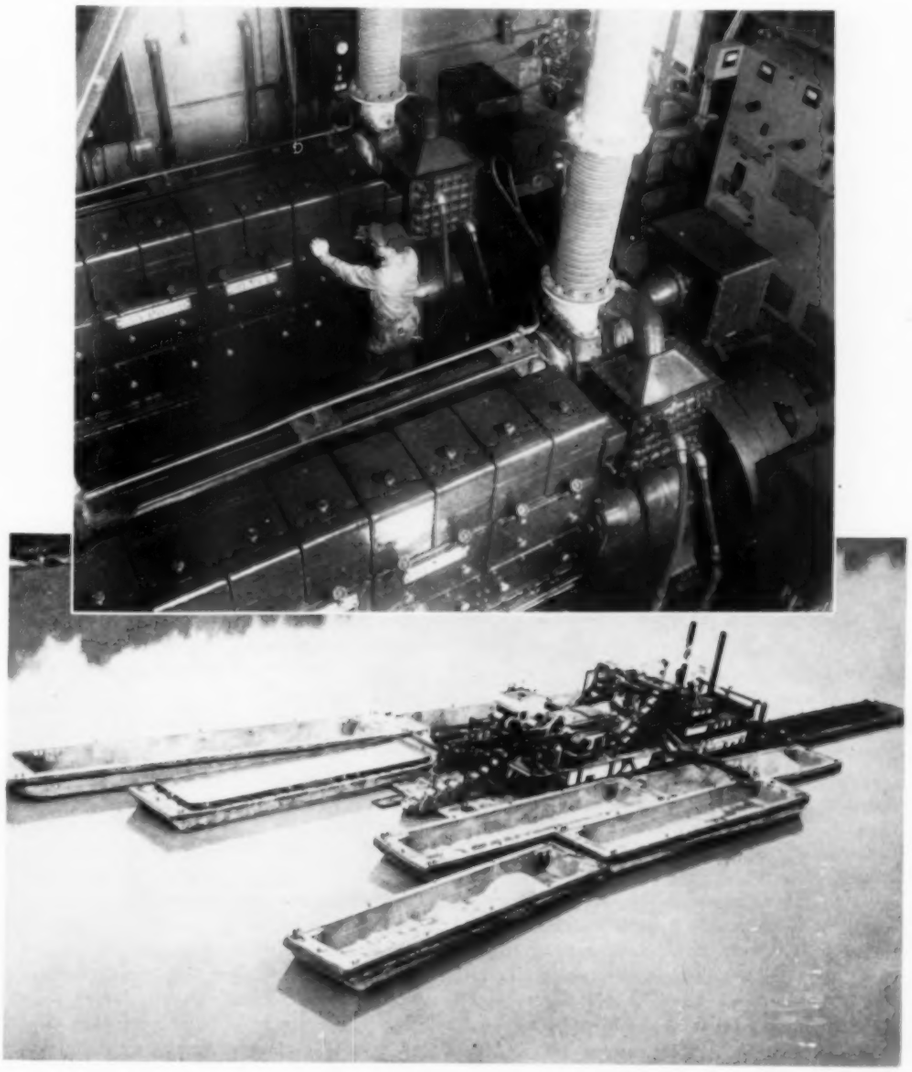
The engines, located side by side in the stern supply power for a 500 kw, 230 volt dc generator rated at 1820 amps, and a 550 kw 230 volt dc generator rated 2,200 amps. The power is controlled from a dead front stand type switchboard where it is distributed to answer the electric load. Switchboard controls include an ammeter, voltage regulator, voltmeter, rheostat, motor control switch and air circuit breaker. Engines and generators are kept running parallel at all times to supply the heavy power load required in a stepped-up operation where 42 men work three, 8 hour shifts to produce 75,000 tons or more monthly. In this round the clock operation, four barges are loaded simultaneously with different material in each barge. A sand and gravel barge are positioned on the starboard side of the dredge while two gravel barges are located on the port side. Material is dredged from a 25 ft deposit, 50 ft beneath the surface in about the middle of the river.

The engines generating the power for today's output replaced the company's old steam turbine equipment, which had not only proven incapable of an economical operation, but lacked sufficient power to do the job, even before the badly needed additions were made to realize the present output. Prior to the expansion and modernization program, the deck equipment of the 199 ft long x 45 ft wide dredge consisted of two chains of elevator buckets, 50 motors, more than 60 lights, numerous heaters of various sizes, a chain of digging buckets and a crusher, each with a large electric motor. Primary additions consisted of increasing the number of electric motors from 50 to 105 in sizes ranging from ¼ hp to 250 hp. Lights and heaters, electric controlled or electric powered were added and a second crusher installed. This points up the dependability. In choosing the White equipment, Davison engineers stressed the importance of obtaining sufficient power not only to handle the additions, but also that of a third crusher to be installed later.

According to the records, fuel and maintenance costs were important factors contributing to the selection of the White engines. Special consideration was given to the open chamber combustion system which permits operation on non-premium fuels. From the standpoint of maintenance, the cylinder block design permits easy accessibility to all internal parts. Inspections are made right on the spot as internal parts are readily accessible from the sides of the block through large openings and removable covers, and the vertical in-line design allows plenty of working space. These factors have contributed greatly to reduced down time and permitted maximum operation at a minimum in maintenance expense. With the production problems licked, J. K. Davison & Brother are looking for one of the most productive years in the history of the company.

**Maintenance Engineer J. K. Davison & Brother Sand & Gravel Co.*

Located side by side the twin diesels are rated 785 hp at 900 rpm. Since their installation two years ago, production has exceeded 75,000 tons of sand and gravel monthly.



GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

Equipment For The Stationary Gas Turbine*

SINCE the installation of the first commercial land gas turbine in 1949, American manufacturers have sold over 250 gas turbines for commercial service. These machines have ranged in size from 1200 kw to 21,800 kw (standard rating at 80°F-1000 ft altitude). Thus the land gas turbine has emerged from the experimental and pioneering stages and is now seeing practical applications in the field. The simplicity of the gas-turbine installation is apparent when it is recognized that this is a self-contained prime mover, but in spite of this, good design is necessary in those items, external to the turbine itself, which are incorporated into the gas-turbine installation.

Inlet-Air Duct: First, the problem of getting air into the compressor: Air requirements range from 349,000 lb per hr (approximately 82,000 scfm) for a 5300-kw unit to 1,370,000 lb per hr (approximately 322,000 scfm) for a 21,800-kw unit. It is usually not practical to draw air from the turbine room since the room would be essentially at ambient temperature whenever the turbine was operating. Therefore air should be ducted in from the outdoors at a reasonable velocity and pressure drop. The air entering the compressor must be clean to avoid erosion or deposition, either of which will reduce compressor efficiency, and increase maintenance. Since a reduction of one per cent in compressor efficiency will reduce net turbine output and efficiency by approximately two per cent, it is important that compressor efficiency be maintained at a high level. Most of the gas turbines installed in this country to date have been equipped with inlet-air filters.

Discharge Ducts and Stacks: In general, sizing of discharge ducts will not be a problem with regenerative gas turbines since the turbine manufacturer normally provides all the ductwork connecting the turbine and regenerator. In the past the regenerator has been located outdoors and the stack mounted directly on top. However, the problem of sizing the stack still must be solved. In addition to this, the design must avoid excessive recirculation of discharge gas into the compressor inlet. Expansion joints are required in both inlet and exhaust ducts because the gas turbine, when in operation, will expand due to changes in temperature. There is also a large amount of expansion in the exhaust duct. Exhaust-gas temperature is approximately 840°F for a simple-cycle machine and 600°F for a regenerative machine. On a 50 ft duct, total expansion of as much as three in. may be encountered. This expansion requires special spring mounting for the duct to insure in-line movement at the expansion joint.

Inlet Filtering: The two basic types of filters that have been applied in gas-turbine installations are: (1) Viscous type—filtration through viscous-coated filter panels. (2) Dry type—filtration through glass fibre pads. The viscous-type air filter can be an automatic, self-cleaning filter that is cleaned and recharged by passing it through an oil reservoir. One type is constructed in the form of an endless curtain of overlapping filter panels, driven by a fractional-hp motor. The oil bath removes foreign matter that has been collected by the filter and prepares the curtain for further filtering action. Operation of the drive motor is intermittent, controlled by an electric timer. For abnormal inlet conditions a timer bypass allows the filter to move continuously. The automatic dry-type filter is a long glass-fibre blanket rolled on a spool. During operation the filter is fed from the supply spool to a discard spool after having accumulated dirt load. The rate at which the timing device drives the blanket requires a replacement of the filter roll about every four months with normal dirt loading and atmospheric conditions. An override on the timer measuring pressure drop across the filter permits satisfactory automatic operation during normal weather.

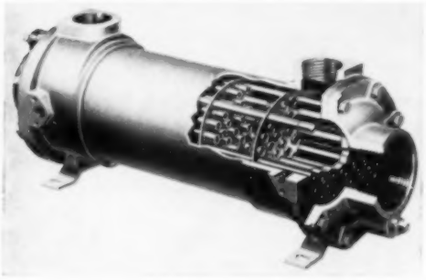
Silencers: Inside the station, near the gas-turbine unit, the noise level will be approximately 95-100 decibels. This level is approximately that experienced inside a boiler plant. With proper inlet and exhaust silencing and good architectural design, sound levels measured at distances of 400-500 ft from the station are reduced to that of traffic noise. Studies of the pressure-drop effects on the gas-turbine due to inlet silencing indicate that 1 to 3 in. of water will normally provide satisfactory performance, normal exhaust-silencer pressure drop is approximately 2 in. of water. Inlet silencers are usually rectangular in cross section, to match the inlet duct. Experience indicates satisfactory performance when air velocities through the silencer section do not exceed 75 fps. Exhaust silencers are circular in construction with straight through flow past an X constructed of acoustic panels. The fibrous material of the panel is enclosed in perforated steel to prevent its being blown out the stack by the 200-fps exhaust gases. Exhaust silencers are usually not applied on gas turbines utilizing a regenerative-cycle or heat-recovery boiler because they act as satisfactory silencers themselves.

Starting Power: Since a gas turbine cannot sustain itself until sufficient combustion air is supplied, cranking power is required to operate the unit at 15 to 20 per cent speed. This will require 2 to 5 per cent of the rated output of the unit. If the gas turbine is driving a compressor or pump which cannot be completely unloaded, the starting device must be adequate to supply this additional load. Where a starting motor is used, it is necessary to insure that the electrical system is adequate for the starting kva of the motor. The manufacturer normally supplies a wound-rotor motor, having 250-300 per cent starting inrush current, complete with controls and automatic disengaging clutch. A small steam turbine, gas-expander turbine, or internal-combustion engine may be used for cranking. In plants where steam is available, a steam turbine may be used, or in the case of a pipeline pumping station a gas-expander turbine is often applied.

Water Requirements: Only a small amount of water is required for cooling the lubricating oil and for the air or hydrogen coolers on the generator. With 95°F water, approximately 500 to 800 gpm are required, depending on the rating of the turbine-generator set. For mechanical-drive applications, cooling-water requirements for the gas turbine alone are less than half the foregoing totals. By cooling the inlet air artifically, output capability and efficiency can be improved. An evaporative cooler (air washer) cools air by evaporating water in direct contact with it. The cooler spray nozzles are normally located behind a viscous type or dry-type air filter. Decreased inlet temperature to the gas turbine, 95°F to 81°F, yields an increase in output of seven per cent.

**Abstract of ASME Paper No. 57-A-142, contributed by the Gas Turbine Power Division at New York, N. Y., Dec. 2nd, 1957 by D. L. E. Jacobs, and I. H. Landes; Engineering Planning and Development, General Electric Company, Schenectady, N.Y.*

Redesigned Heat Exchanger Line



An expanded line of Type BCF Exchangers, with improved performance, new design features and new materials is now available at lower prices, announces Ross Heat Exchanger Division of American-Standard. Described as "a big step forward in the continuing refinement of this compact, standardized exchanger," the 1958 BCF is now offered in 46 sizes; one, two and four pass designs; and 1.2 to 124 sq ft of heat transfer surface. Fully pre-engineered and carried in stock, the new line embodies numerous improvements, including: New baffle structure with flanged lip at each tube hole and around outer edge to give tighter tube fit and improved thermal characteristics; stamped steel feet movable in three positions around hubs for easy, more adaptable mounting; hubs relieved under connections for unrestricted flow; corrosion resistant copper alloy core assembly and rugged cast iron bonnets. The new Ross BCF Line is designed for cooling lube oil, jacket water, hydraulic and other fluids, as well as many process heating applications. Complete information can be obtained by requesting new Ross Bulletin 1.1K6 from Ross Heat Exchanger Division of American-Standard, Buffalo 5, New York.

Vibration Recorder

The Davey Hand Vibrograph is a compact self-contained instrument for making permanent records of machinery vibration on a continuous paper chart. It measures amplitude and frequency. Wave forms are shown in detail. A salient feature is an instantaneous external adjustment which selects the degree of magnification desired, giving 40, 20, 10 or 5:1 ratios. No battery or outside power source is required. A carbon shod ball bearing probe is provided for taking measurements directly on the surface of rotating shafts. For more information write The Vibroscope Co., P. O. Box 97, Glenford, N.Y.

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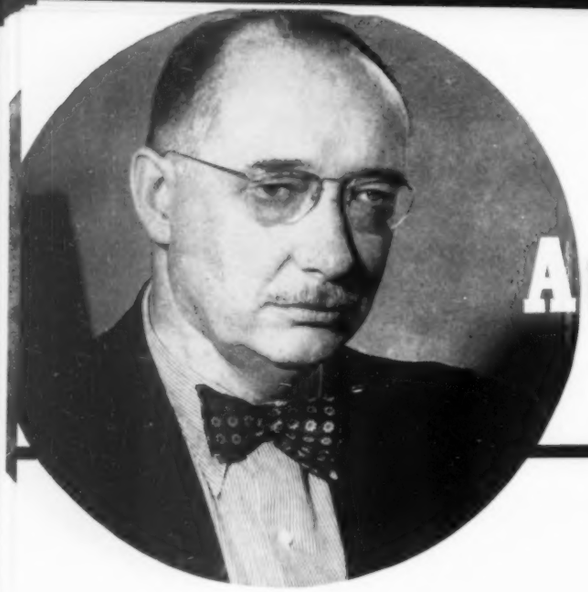


AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Inherent Economy Of Diesels

ECONOMY of fuel cost is recognized as the principal reason for the ever-increasing popularity of diesels for automotive vehicles. In terms of cost of fuel per mile of operation, in comparable vehicles, the diesel-powered one will cut the fuel bill about in half. There are several reasons why this is so, the least of which is the cost of the fuel per gallon. Even at the same price, the diesel's fuel cost per mile is far below that of a similar vehicle, gasoline-powered. For this there are fundamental reasons, centering basically around the fact that the diesel cycle is inherently more efficient than the Otto cycle of the gasoline engine. By its very nature, the diesel consumes less fuel per horsepower-hour developed. Compression pressure is the principal difference, as the diesel can, indeed it must, operate at compression pressures which are higher than would be practicable in a gasoline engine. As is well known, the higher the compressison pressure, the more efficiently the fuel is burned.

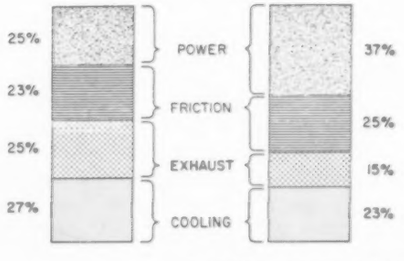
In a modern heavy-duty gasoline engine about 25 per cent of the latent energy or b.t.u.s in the fuel are converted into active power, while the best diesels so convert 37 per cent. This is known as Thermal Efficiency. Even this comparison does not do full justice to the diesel, since diesel fuel is heavier than gasoline and contains more b.t.u.s per pound. Thus No. 2 diesel fuel on the average contains about 13 per cent more latent energy than gasoline. Part of this gain is due to the fact that the fuel is burned more completely; that is, more of the b.t.u.s are converted into heat. This means that there is less loss of energy through the exhaust. In a gasoline engine the exhaust loss amounts to about 25 per cent, whereas in the diesel it is only 15 per cent. Another part of the gain is found in lower losses to the coolant. Diesels reject less heat to the cylinder walls, heads, valves, etc. than do gasoline engines. The comparison is in the order of 27 per cent in the gasoline engine as against 23 per cent in the diesel. In one respect the diesel is less efficient than the gasoline engine. That is in mechanical efficiency, or so-called friction loss. This consists of a complex of losses including the mechanical friction of the working parts, which is slightly higher in the diesel because of the higher pressure at which it operates. Altogether these losses amount to about 23 per cent in a gasoline engine and 25 per cent in a diesel.

But this is not all. The diesel has no throttle, so that it operates at maximum volumetric efficiency at all times. By this is meant that it always takes in its full capacity of air. There is a minimum of vacuum in the cylinders. By the nature of its operation, it can operate at very high fuel-air ratios; that is, extremely lean when idling or under part load, whereas in the gasoline engine the mixture ratio has to be relatively constant at all speeds and loads. Because of lower heat rejection to the coolant, diesels require less air circulation through the radiator than do gasoline engines. This involves fans of correspondingly lower capacity and consequently less horsepower absorption. In some cases this amounts to a saving of as much as 5 hp. There are other savings, too, which, while minor, add up to a worthwhile amount. Diesel fuel is less volatile than gasoline, so there is less loss through the tank vent. It does not vapor lock, thus preventing stalling and difficulty in restarting in hot weather. Because the exhaust is lower in temperature and pressure than in the gasoline powerplant, smaller mufflers may be used and they usually last longer. In some turbocharged diesels, no muffler at all is required to keep the sound level below the 125-sone noise limit. This is the effect of the pre-expansion and cooling which the exhaust goes through while in the turbine.

Sometimes there is confusion when the specific fuel consumption ratings of diesel engines are compared with the actual road economy results. Dynamometer tests of fuel economy are recorded in terms of pounds of fuel per brake horsepower-hour. But operators do not buy fuel by the pound. Diesel fuel, like gasoline is bought by the gallon. By the pound, there is little difference in the heating value of the two fuels; but as diesel fuel is heavier per gallon than gasoline, it contains 13 per cent more latent energy or b.t.u.s than gasoline. Combining this difference with the fact that the difference of 12 per cent in thermal efficiency really means that the diesel is 48 per cent more efficient than the gasoline engine, gives us a theoretical difference in brake horsepower-hour per gallon of fuel of 67.24 per cent in the diesel's favor. Even at the same price per gallon, with tax, this would make the diesel's fuel cost per horsepower-hour about 60 per cent of that of a corresponding gasoline powerplant. Actually, the experience of a large segment of users in highway transport indicates an average saving of about half that of the gasoline engine, in terms of cents per mile.

There has been considerable confusion regarding the relative economy of the turbocharged diesel and that of the naturally-aspirated type. Where dynamometer tests show substantially identical specific fuel consumption of two engines of the same displacement, one turbocharged and the other not, it has been assumed that both would show the same miles per gallon and hence the same fuel cost per mile. This would be the case if both were called upon to deliver their power at the same rate per hour, which would mean that over identical routes with equal gross weights, they had the same average speed. In that case each would be producing the same brake horsepower per hour. But no sensible operator would be content with no better performance from a more powerful engine. His motive in specifying the turbocharged version of the same basic engine would be to secure better top speed, faster time on grades, ability to move greater payloads on the same schedule; any one or a combination of these. In each case, of course, the engine would be doing more work and hence putting out more horsepower per hour. At the same specific consumption, therefore, it would be burning more

Comparative energy distribution; gasoline engine on left; diesel on right—representative of modern heavy-duty engines of both types.



fuel per mile. It is because this better performance produces more revenue ton-miles of transportation per hour that operators demand the increased power. So, even though the fuel cost may be slightly higher, the revenue per mile will be increased sufficiently to show a net gain.

At one time it was the experience of operators that despite large savings in fuel costs, maintenance costs of diesels were greater than those of comparable gasoline engines. Consequently they found that the net saving was considerably less than comparative fuel cost economy. This is emphatically not the case in the majority of operations today. Part of this is attributable to better understanding of operating and maintenance requirements of the diesel and partly to material improvement in the quality of the engines themselves. Accordingly many operators find that diesels outlast gasoline engines and cost less per mile to maintain. There was a time when, aside from the maintenance cost of the engine, chassis repair costs were higher with diesels, due to the comparative harshness of the diesel and to the fact that their restricted speed range made more frequent shifting necessary. Modern diesels, thanks to greater refinement and better balancing, particularly in the general use of counterbalanced crankshafts, better combustion control and in some cases variable injection timing, run much more smoothly than previously. While it is still desirable to shift more frequently with diesels, improved multi-speed transmissions have so simplified the process that it ceases to be too much of a chore and, with more general use of constant-mesh gearing, it occasions no greater maintenance cost. Today it may be predicted with confidence that a properly applied diesel engine will cut the fuel bill of a corresponding gasoline-powered vehicle in half, with no greater maintenance cost for the vehicle as a whole. Thus the higher investment can be written off from the fuel cost savings while the vehicle is still in its prime.

COMPARATIVE HEAT VALUE*

Fuel	btu/lb	lb/gal	btu/gal
Gasoline	18,660	6.135	114,480
No. 1 diesel	18,300	6.91	126,453
No. 2 diesel	18,400	7.034	129,425

*Subject to geographical variation

Appointed Sales Manager

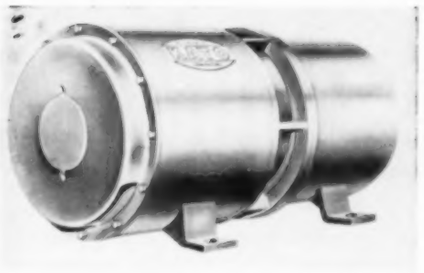
David C. Graham

David C. Graham's appointment as sales manager of Burmeister & Wain American Corporation has been announced by Poul A. Christensen, President. Originally from Dayton, Ohio, Mr. Graham studied mechanical engineering at Pennsylvania State College. He has had extensive experience in the marine power field, and for the past ten years was associated with Nordberg Manufacturing Company as their sales engineer on the East Coast. After familiarizing himself with the various engine types available at the Lathrop Engine Division and after a 7-week tour of the parent company's plants in Denmark, Mr. Graham has now taken up his new duties at the main office of the American company in Mystic, Connecticut.

Brushless Motor-Generator Set

Four small models of 400 cycle per second motor generator sets have recently been developed by Kato Engineering Company, Mankato, Minnesota. Illustrated is a 2000 watt model. The alternator is of the inductor type with 115 volt, single phase output. The capacity start 4 hp drive motor maintains speed of 3428 rpm.

The unit is 25 inches long and 13 inches high.



These motor generators in sizes of 500, 1000, 1500, and 2000 watt sizes can be supplied with special radio filtration, indication and control panels as well as vibration dampers.

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FUEL INJECTION EQUIPMENT
for Diesel Engines

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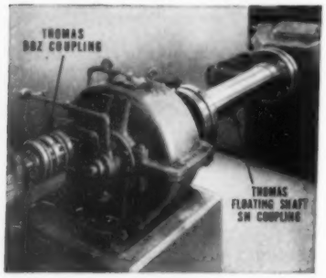
Give You Freedom From Coupling Maintenance



NO LUBRICATION

NO MAINTENANCE

NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
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5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
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Write for Engineering Catalog 51-A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U. S. A.

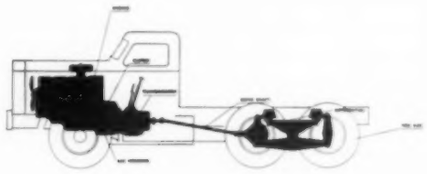
How to Order Transmissions for 1. Replacement 2. New or Repowered Applications

By L. C. BUTLER*

When transmissions are ordered either for use with a new engine or for replacement purposes, detailed information on the specifications of the truck chassis or machine in which the unit is to be installed should always be provided in full. Otherwise, the transmission manufacturer is confronted with the problem of identifying both capacity and construction of the transmission. *Capacity*—In connection with the capacity of the transmission, the transmission manufacturer needs the following information: 1—Make and model of engine; 2—Maximum torque and horsepower output; 3—Reduction ratio of driving axle; 4—Tire size on both driving and steering axles; 5—Gross weight of truck or combination of tractor and trailer; 6—Type of service; 7—Tire size, both front and rear.

Construction—The replacement transmission must correspond to the basic specifications of the engine, clutch, parking brake, and universal joint arrangement. This is particularly important in a motor truck, because all these units are usually retained in the vehicle, when the transmission is changed.

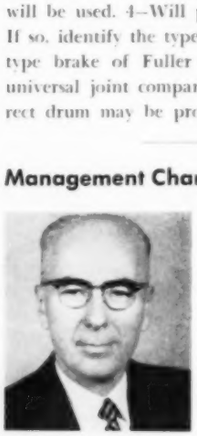
Normally, the construction of the transmission is resolved on the basis of the following: 1—S.A.E. size of engine flywheel housing; 2—Distance from the friction surface of the clutch flywheel to bolting face of the engine flywheel housing. This dimension is required to identify the length of the clutch release bearing carrier, so that both complete release and complete wear-in of the clutch can be secured. 3—Make and model of clutch which will be used. 4—Will parking brake be required? If so, identify the type, make and model. If band type brake of Fuller manufacture, identify the universal joint companion flange so that the correct drum may be provided. 5—Length to which the longer of the two clutch pedal shafts is to project from the clutch housing. Pedal shafts of varying length can be provided, so that the clutch pedal can be located in the original slot in the floor boards. 6—Will speedometer drive gear or corresponding spacer be used? Spacers corresponding to the length of speedometer gears can be furnished, but speedometer gearing must be ordered from the manufacturer. Speedometer gearing can be identified by the manufacturer only on the basis of the identity of the transmission, the reduction



ratio of the driving axle, and the size of the tires on the drive wheels. 7—If the vehicle is of the COE or cab-forward type, a remote control must be used. Normally, each transmission manufacturer provides remote controls adaptable to his transmissions. On this basis, Fuller must have details relative to: (1) distance between the gear shift lever and the neutral path in the shifting yokes and blocks in the transmission; (2) location of gear shift lever in relationship to the driver's seat; and (3) the distance from the centerline of the transmission to a point at the side which will clear the clutch and flywheel housings. 8—If the nature of the cab requires bends in the gear shift lever and brake lever, sketches should be provided.

**Manager—Service Sales, Fuller Mfg. Co., Transmission Division, Kalamazoo, Michigan.*

Management Changes



J. A. Packard

L. C. Butler

Fuller Manufacturing Company, Transmission Division, Kalamazoo, Michigan, has announced several changes in personnel responsibilities. W. E. Niness, Vice President, formerly in charge of Sales, has been moved to a staff position. This change is made in preparation for his retirement which will take place in 1958. J. A. Packard, Manager Original Equipment Sales, has been promoted to the position of General Sales Manager. In this capacity he will be responsible for both Sales and Service. L. C. Butler, Manager Service Sales, has been promoted to the position of Assistant to the General Sales Manager. Corresponding changes in the company's Service organization are as follows: B. S. Tooker is in charge of all Service activities, with the title of General Service Manager. R. E. Olmstead has been named to head up all Technical Service activity, with the title of Technical Service Manager. K. B. Klump has been appointed Service Parts Manager and is in charge of all Parts activity.

Miami Boat Show

A dry land armada numbering over 200 craft of every size and description will command the attention of the Southern Yachting Fraternity when the 17th annual Miami International Boat Show opens in the Dinner Key Auditorium on February 21st 1958. Announced as the South's greatest marine exposition, the show will run daily from 11:00 a.m. to 11:00 p.m. through February 26th. Over 200 national and international manufacturers and distributors of boats, marine engines and their accessories will display over a million dollars worth of nautical equipment. General Motors along with Continental and Gray Marine will have their usual fine display. The Engine Division of Allis-Chalmers, Caterpillar Tractor and Hercules will also be there along with American MARC to display their diesels at America's Winter Yachting Center, Miami.

HIGH CAPACITY MARINE GEAR

By BRUCE W. WADMAN

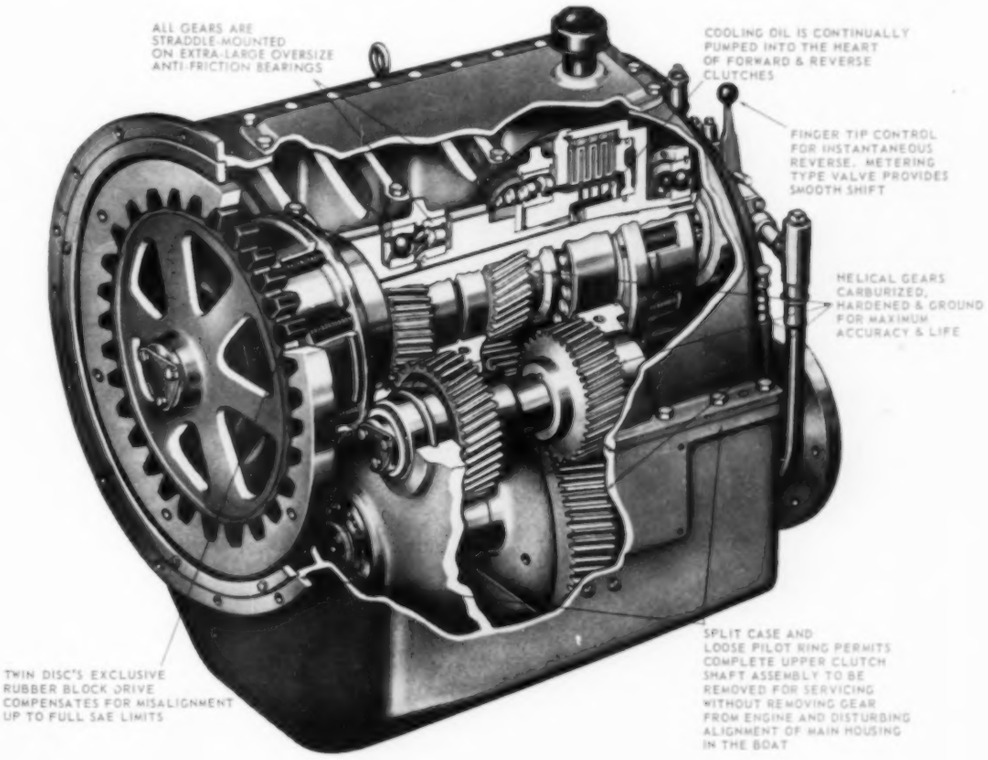
A NEW high-capacity marine reverse and reduction gear designed for today's higher speed, higher horsepower marine diesel engines has been announced by Twin Disc Clutch Company, Racine, Wisconsin. Designated the model MG-521, the new unit is rated for engines producing up to 450 continuous horsepower at governed speeds ranging from 1625 to 1850 rpm. This high horsepower rating through a broad speed range makes the MG-521 suitable for a wide variety of engine makes and models. The new MG-521 marine gear features finger-tip control for forward, neutral and reverse. The control is through a selector valve, which hydraulically actuates the oil-cooled, multiple-plate forward and reverse clutches. Instantaneous clutch release assures fast response when shifting from forward to reverse. Smooth clutch engagement is provided by a differential mechanism in the selector valve, which permits a steady rise of actuating oil pressure from 35 psi to the maximum of 150 psi in smooth, even increments—all in one second.

An oversized oil pump is directly driven by the marine gear reverse shaft, and involves no chains or gears. Besides providing pressure for actuating the clutches, the pump directs oil into the heart of each clutch through the inside diameter. This flood of oil carries away heat, assures smooth clutch engagement and reduces clutch plate wear. Oil is also pumped to provide forced feed lubrication to all gears. An outstanding feature of the MG-521 marine gear is the unique arrangement of five hardened and ground helical gears straddle-mounted on anti-friction bearings on short, rigid shafts. This basic design, combined with heavy-duty construction assures long life under even the most adverse operating conditions. Another important feature is that the MG-521 may be operated continuously in reverse at its continuous horsepower rating with no decrease in service life.

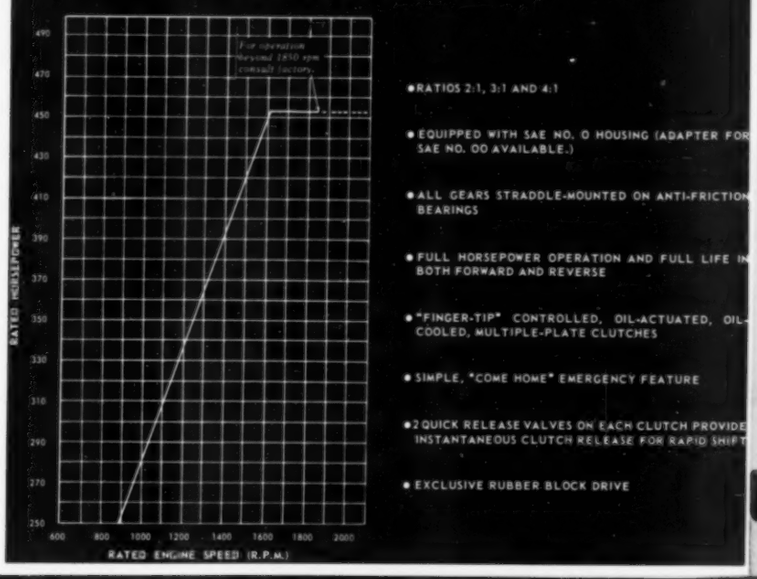
Engine power is transmitted to the MG-521 through Twin Disc's exclusive rubber block drive. This drive permits the transmission of engine torque through rubber, which tends to cushion vibrations and shock loads. The rubber block drive will withstand a normal amount of misalignment without imposing undue loads and stresses on the marine gear input shaft or on the engine crankshaft. Accessibility for servicing is an integral part of the MG-521's design. The housing is split in an unusual manner which permits removing the top half for disassembling the clutches and gear train without removing the lower portion of the marine gear housing from the engine or disturbing the gear's alignment. The pump is serviced just as easily, as it plugs into the reverse shaft and is held in place by four cap screws.

The new marine reverse and reduction gear is offered with reduction ratios of 2:1, 3:1 and 4:1 and, as standard, is adaptable to engines having SAE No. O flywheel housings. Length of the marine gear from flange to flange is 33.50 in. The weight of the MG-521 with 12 gal. oil is 2100 lbs.

Cutaway view of the Twin Disc MG-521 marine gear.

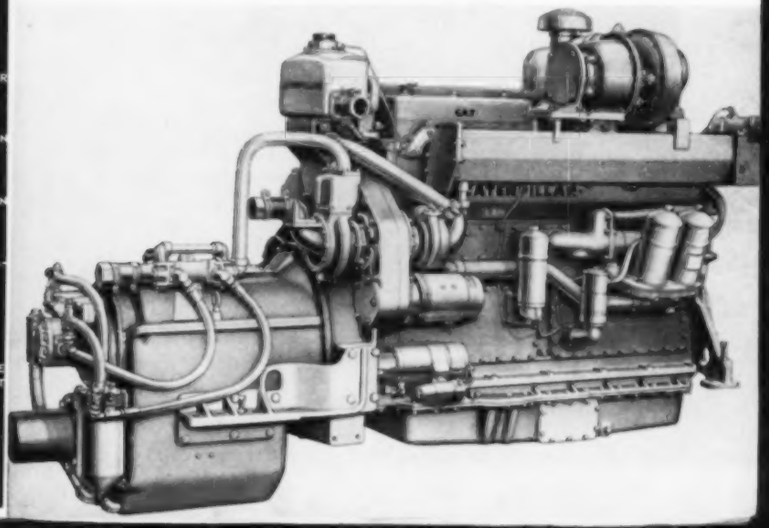

ALL GEARS ARE STRADDLE-MOUNTED ON EXTRA-LARGE OVERSIZE ANTI-FRICTION BEARINGS
COOLING OIL IS CONTINUALLY PUMPED INTO THE HEART OF FORWARD & REVERSE CLUTCHES
FINGER TIP CONTROL FOR INSTANTANEOUS REVERSE. METERING TYPE VALVE PROVIDES SMOOTH SHIFT
HELICAL GEARS CARBURIZED, HARDENED & GROUND FOR MAXIMUM ACCURACY & LIFE
SPLIT CASE AND LOOSE PILOT RING PERMITS COMPLETE UPPER CLUTCH SHAFT ASSEMBLY TO BE REMOVED FOR SERVICING WITHOUT REMOVING GEAR FROM ENGINE AND DISTURBING ALIGNMENT OF MAIN HOUSING IN THE BOAT
TWIN DISC'S EXCLUSIVE RUBBER BLOCK DRIVE COMPENSATES FOR MISALIGNMENT UP TO FULL SAE LIMITS

• MG-521 FEATURES •



- RATIOS 2:1, 3:1 AND 4:1
- EQUIPPED WITH SAE NO. 0 HOUSING (ADAPTER FOR SAE NO. 00 AVAILABLE.)
- ALL GEARS STRADDLE-MOUNTED ON ANTI-FRICTION BEARINGS
- FULL HORSEPOWER OPERATION AND FULL LIFE IN BOTH FORWARD AND REVERSE
- "FINGER-TIP" CONTROLLED, OIL-ACTUATED, OIL-COOLED, MULTIPLE-PLATE CLUTCHES
- SIMPLE, "COME HOME" EMERGENCY FEATURE
- 2 QUICK RELEASE VALVES ON EACH CLUTCH PROVIDE INSTANTANEOUS CLUTCH RELEASE FOR RAPID SHIFT
- EXCLUSIVE RUBBER BLOCK DRIVE

New Twin Disc MG-521 marine reverse and reduction gear installed on a Caterpillar D353 marine diesel.



Gulf Coast Diesel Notes

By Michael T. Pate

MATAGORDA Shell Company, Matagorda, Texas, will power the tug *Allan W.* with a matched pair of General Motors diesels, series 110, model 62206, each equipped with hydraulic reverse and reduction gear. The twin-screw, 55 ft vessel will be lighted by a Stewart & Stevenson model 2GD-23 generator set, powered by a General Motors series 71, model 2-71 diesel. All power equipment was furnished by Stewart & Stevenson Services, Inc., of Houston, Texas.

BLUDWORTH Shipyard, Inc., Houston, Texas, has taken delivery from Stewart & Stevenson Services, Inc., of two model 4GD-48 kw marine type ac generator sets, each powered by a General Motors 4-71, 4-cylinder diesel.

WORK-OVER, Inc., Houston, Texas, has taken delivery through Continental-Emsco of Houston, of an air-compressor unit in which a Gardner-Denver compressor is driven by a model 2BD77 Allis Chalmers diesel. The unit, furnished by Applied Power Equipment & Manufacturing Company, Houston, will be used in the company's Gulf Coast operations.

J. S. GISSEL Company, Houston, Texas, has purchased from Stewart & Stevenson Services, Inc., Houston, a model 29GD-23 Stewart & Stevenson ac generating set, powered by a General Motors 2-71 diesel.

SUPERIOR Oil Company, Houston, Texas, has had Stewart & Stevenson Services, Inc., of Houston, unitize a 3CM Westinghouse air compressor with a General Motors 2-cylinder, 2-71 diesel.

CHEMICAL Process, Breckenridge, Texas, has purchased from Cummins Sales & Service, Fort Worth, Texas, two model VT-12-BI Cummins diesels, each rated at 600 hp. The company will use the diesels in its West Texas operations.

CONVAIR, Fort Worth, Texas, has bought from Stewart & Stevenson Services, Inc., Houston, Texas, a special 125 kva, 400 cycle ac generating set, powered by a model 6-71, 6-cylinder General Motors diesel, the unit being trailer mounted.

THE CORPS of Engineers, U.S.A., through the Chicago Procurement Office, has taken delivery from Stewart & Stevenson Services, Inc., Houston, of 100 45 kw ac generating sets, each being powered by a model 4-71, 4-cylinder General Motors diesel.

THE Brewster Company, Shreveport, Louisiana, has bought from Waukesha Sales & Service, Inc., Houston, Texas, a model 6LRDBU Waukesha diesel, rated 381 hp at 1100 rpm, which will be unitized with one of the company's drilling rigs.

GULF Oil Corporation, Houston, Texas, has obtained from Stewart & Stevenson Services, Inc., Houston, a model 2GD-23 Stewart & Stevenson ac generating set delivering 23 kw. The unit is powered by a General Motors diesel, model 2-71.

CARDWELL Manufacturing Company, Houston, Texas, has purchased from Stewart & Stevenson Services, Inc., Houston, two oilfield utility units, each comprising a 20 kw ac generator, an air compressor, a washdown pump and an arc-welding generator, all powered by a model 2-71 General Motors diesel.

THE WESTERN Company, Midland, Texas, has obtained from Cummins Sales & Service, Fort Worth, Texas, a model VT-12-BI Cummins diesel rated

BOUGHT 30 MORE

Since they switched to "Jimmy" Diesels

Pennsylvania quarry operators, D. M. Stoltzfus and Son, Inc., bought their first General Motors Diesel in a Koehring Dumptor back in 1945. Now they have more than 30 "Jimmys" operating in four plants, producing over 5,000 tons of crushed stone per day.

Job Superintendent Warren Benner says: "Interchangeability of parts is a decided advantage with GM Diesel engines. With a small stock of spare parts, we can take care of most service jobs ourselves and get equipment back on the job with minimum lost time. GM Diesels start quickly, are easy to operate and give us long periods of trouble-free performance between overhauls. I can't trace one instance where GM Diesels have failed us on the job."

Add the faster work output of these dependable 2-cycle engines to ease of maintenance and lower cost of interchangeable parts, and you have the reasons operators everywhere standardize on GM Diesels. For full facts, call your GM Diesel distributor or write us.

DETROIT DIESEL Engine Division of General Motors, Detroit 28, Michigan

GM GENERAL MOTORS DETROIT DIESEL POWER

Regional Offices: New York, Atlanta, Detroit, Chicago Dallas, San Francisco

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Now—more than ever—it pays to standardize on GM Diesel—available in 1485 applications of power equipment built by more than 175 manufacturers

Parts and Service Worldwide

GM "6-110" Diesel drives hammermill at plant in Cedar Hill Quarry of D. M. Stoltzfus & Son, Inc., Talmage, Pa.

at 600 hp. The diesel will be used to drive a Fracmaster 600-C unit.

THE WALTER E. Company, Houston, Texas, has bought from Stewart & Stevenson Services, Inc., of Houston, two model 4GD-48 ac generating sets. The 48 kw units are each powered by a General Motors diesel, model 4-71.

PETROLI Del Asoli, Houston, has taken delivery from Stewart & Stevenson Services, Inc., Houston, of a 23 kw model 2GD-23, ac generating set, powered by a model 2-71 General Motors diesel.

SHORELINE Drilling Company, New Orleans, Louisiana, has secured from Waukesha Sales & Service, Inc., Houston, Texas, a model WAKDSU 125 kw generating set powered by a Waukesha diesel.

CALIFORNIA-Texas Oil Company, Houston, Texas, has purchased from Stewart & Stevenson Services, Inc., Houston, two General Motors 6-cylinder, series 110, model 62206 diesels, each equipped with 2:1 hydraulic reduction and reversing gears.

PARKER & Son, San Benito, Texas, have bought from Stewart & Stevenson Services, Inc., Houston, a series 71, 6-cylinder model 6071-A General Motors marine diesel, equipped with a 4:1 hydraulic reduction and reversing gear. The engine is rated at 200 hp.

SUPERIOR Oil Company, Houston, Texas, has bought a 5 kw explosion-resistant ac generator set powered by an Onan model DRP diesel. The unit was furnished by Stewart & Stevenson Services, Inc., of Houston, Texas.

Branch Manager

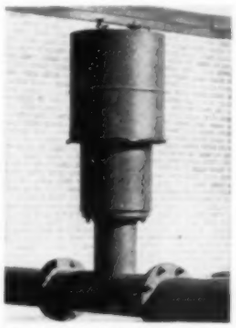
Mr. Robert H. Morse, Jr., President, Fairbanks, Morse & Co., has announced the appointment of Mr. James G. Graham as Manager of the firm's Los Angeles sales and service branch. He will succeed Mr. Paul A. Suess who retired on January 1, 1958. Mr. Graham joined the Fairbanks-Morse organization in 1946. For the past two years he has been General Manager of the Railroad Division with headquarters in Chicago. Previous to that time he had been Eastern Regional Manager for the same division and was located in New York City.

Turbine Silencing Brochure

How the noise of a gas turbine engine can be effectively silenced is explained in a 12-page brochure recently published by the Industrial Sound Control Department of Koppers Company, Inc. The detailed brochure outlines ten steps which will enable a gas turbine engineer to quickly determine what type of sound control unit is necessary to silence his turbine. This is possible, the company says, because Koppers gas turbine silencers are standardized and because the range of types and sizes are applicable to a wide variety of conditions. Included in the brochure are pictures and drawings of two typical types of Koppers gas turbine silencers. One shows the use of Soundmetal panels of special design and the other employs the unique Soundstream principle which achieves broad band frequency control. Copies of the brochure can be obtained by writing to: Industrial Sound Control Department, Koppers Company, Inc., Metal Products Division, P.O. Box 298, Baltimore 3, Maryland.

ITS NEW

NOW AVAILABLE! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½", fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL PROGRESS,** 816 N. La Cienega Blvd., Los Angeles 46, Cal.



On the job *DA filter provides rugged, compact mounting on air intake to industrial air compressors.*

Here's real proof that the Air-Maze DA dry-type filter is one of the most efficient mechanical filters available today for air cleaning application on engines, compressors, blowers and other industrial uses.

After two years continuous duty:

1. Pressure drop through the filter has increased only .3" with no maintenance whatsoever.
2. All inside surfaces are still clean.

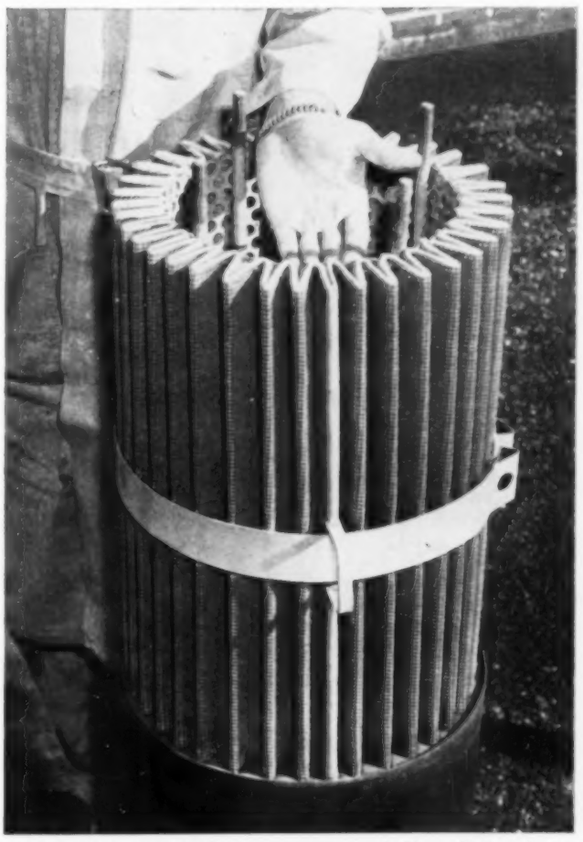
Built for use where oil-free air is required, the DA filter provides better than 98% efficiency with particles of 2 micron mean diameter and 100% efficiency with particles 5 microns and larger. Made in sizes from 20 to 6650 cfm. Ideal for service when air velocity varies from one period to another and when vibration is present to help dirt removal.

Write for catalog DA-1056. The Air-Maze Corporation, Cleveland 28, Ohio, Dept. DP-2.

AFI MEMBER AIR FILTER INSTITUTE

AFTER TWO YEARS

...with no maintenance, pressure drop increased only .3" on this Air-Maze filter



Air-Maze DA dry type filter *with cover removed. Shows high-grade felt filtering media arranged in deep pleats to provide extended area and armored on both sides by heavy galvanized cloth.*

AIR-MAZE
The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

Mid-Continent Diesel News

By **Jack F. Cozier**

WILLIAMS Brothers Co., Tulsa, Oklahoma, bought a Cleveland model 320 ditcher from Leland Equipment Co., Tulsa, powered by a Cat diesel engine. The unit was shipped overseas for foreign work.

McMICHAEL Asphalt Co., Tulsa, Okla., purchased a John Deere model 820 tractor with diesel engine for pulling a Hancock Elevating scraper for excavation work around Tulsa. The sale was made by Tulsa Equipment Co., Tulsa.

CHEMICAL Process Division of BJ Service, Inc., Fort Worth, Tex., took delivery on a new well servicing unit assembled by Cummins Sales & Service, Inc., Fort Worth. Power is supplied by two Cummins VT-12-I turbodiesel engines and equipped with a Cotta #977 six-speed transmission powering two modified Gardner Denver PA8K Triplex pumps. The new unit is the second of five such units to be assembled for Chemical Process.

GRAFTON Boat Works, Grafton, Ill., bought two Allis-Chalmers Buda 6 DA-MR-779 marine diesel engines from Arrow Engine Sales & Service, Inc., St. Louis, Mo., to be placed in the towboat *Arizona*, built for Geo. A. Mason Towing Co., Smithland, Ky. The units develop 162 shp at 1800 rpm and are equipped with Twin Disc mechanical gear with the electric power being supplied by an Allis-Chalmers model 2 BD-MG-77 diesel generator set rated at 7½ kw.

GRUENDLER Crusher & Pulverizer Co., St. Louis, Mo., purchased an Allis-Chalmers 6 DA-844 diesel unit from Arrow Engine Sales & Service, Inc., St. Louis, for use on a portable rock crusher.

CUMMINS Sales & Service, Inc., Fort Worth, Tex., sold to Halliburton Oil Well Cementing Co., Duncan, Okla., two 600 hp model VT-12-BI Cummins diesel engines for installation on a Halliburton pump.

GULF Coast Research Laboratories 42 ft trawler *Hermes* located at Ocean Springs, Miss., has an Allis-Chalmers 6DAMR-273 diesel engine for main propulsion and net winch power. The steel trawler was built, equipped and sold by Kremer Motor Co. Shipyard, Gulfport, Miss.

W. & R. Construction Co., Pampa, Tex., has purchased a Cleveland trencher model 140 from Leland Equipment Co., Tulsa, Okla. The unit is powered by an International UD-350 diesel engine.

ROSE Oil Company has installed in their yacht *Ride with Rose* an Allis-Chalmers model 120-240v, 16 kw diesel engine generator set for all electric appliances including air conditioning and refrigeration.

TAYLOR Construction Co., Tulsa, Okla., has bought an Insley model L back hoe from Tulsa Equipment Co., Tulsa. The unit, powered by a Cat D315 diesel engine, is now working on the extension of the Mingo sewer line in Tulsa.

HAZELL Machine Co., Renovator Division, Dexter, Mo., installed an Allis-Chalmers model 6 DAS-844 diesel engine from Arrow Engine Sales & Service, Inc., St. Louis, Mo., in a Landmaster soil preparation farm machine.

KREMER Motor Co. Shipyard, Gulfport, Miss., recently replaced the gasoline engines and renovated the Knox Glass, Inc. 64 ft yacht *Kay Gee B II* with

FAMOUS LAST WORDS:

"they wouldn't dare"

That's what they said the day before Pearl Harbor. Remember? But by now you'd think people would have learned. Let's face it—we must be ready for disaster at any moment. It may be an atom bomb—or it may be a fire, a flood, a hurricane. It's only common sense to be prepared for it, whatever it is. Take these precautions TODAY:

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

two Allis-Chalmers 162 shp model 6DAMR-799 diesel engines. Kremer also added a Walters keel cooler and Columbian five bladed Pentadyne wheels.

SERVTEX Materials Company, New Braunfels, Tex., operates nine trucks, a locomotive, and a shovel powered by Cummins diesel engines. The trucks are ten-yard Euclids with Cummins HRBI-600 engines. A G-E 65-ton locomotive is powered by two NHRS-600 Cummins diesels and the shovel is a model 71-B Bucyrus Erie unit powered by Cummins NHRS diesel. Servtex mines, processes and sells crushed limestone and manufactures asphalt.

AMERICAN Machinery, Inc., Lafayette, La., has delivered another Wire-Line reel powered by an Allis-Chalmers 4DA-153 diesel engine to a major drilling and producing oil company for use in their offshore operation in the Gulf coast.

KERRVILLE Bus Company, Kerrville, Tex., recently added seven Beck Scenicruisers powered with Cummins JT-6 turbodiesel engines. Kerrville operates locally from Houston through Abilene, transcontinentally through cooperation with national bus companies.

OCTAVE Hebert, Biloxi, Miss., owner of the trawler, *Lucy Eve*, had an Allis-Chalmers model 6DAMR-273 marine diesel engine installed in his ship by Kremer Motor Co. Shipyard, Gulfport, Miss.

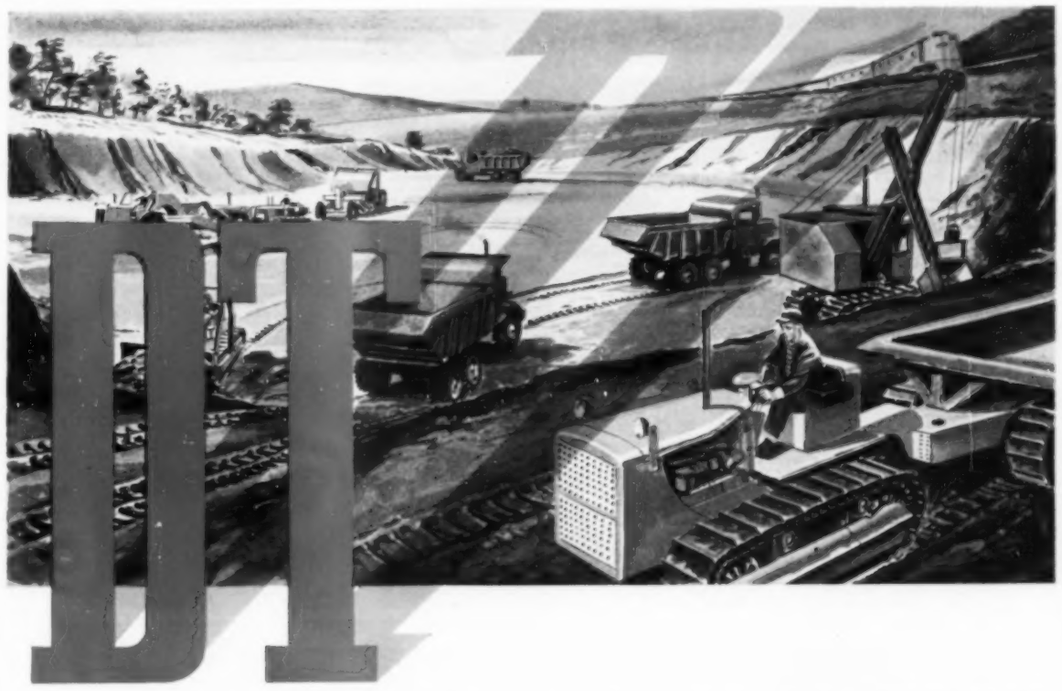
60th Anniversary Brochure

Sixty years of growth and development are outlined in a new brochure issued by Wm. W. Nugent & Co., Inc., 3440 Cleveland St., Skokie, Ill. This anniversary booklet details the founding of the company in the late 1800's by William W. Nugent and his early associations with people who started some of our largest diesel engine manufacturers on the way to the prominence they enjoy today. From William Nugent's invention of the Gravity Center-Oiler, which started him in business back in 1897, the brochure traces developments and applications up to the present day where Nugent lube and fuel oil filters are found installed on all types of diesel engines.

Wm. W. Nugent & Co. has been closely associated with the Diesel Industry from its early beginnings in this country and this brochure serves admirably as a chronicle of diesel history as well as pointing out the most recent applications of Nugent filters on today's modern diesel engines. Write Wm. W. Nugent & Co. for a copy of this brochure.

Announces New Name

Roper Hydraulics, Inc., a new Illinois corporation, started operation November 1, taking over the pump business of Geo. D. Roper Corporation, Pump Division. This change is in keeping with a program started in 1949, separating the pump operations from the household appliance activities of the corporation. The purpose of this change was to develop exclusive management, provide improved products, and more efficient sales engineering service for industrial pump users. The new corporation will utilize the same plant and facilities as the Roper Pump Division. The same personnel will continue to develop the program of research and development to manufacture quality pumps with sales and service for a wide range of industrial applications. The officers of Roper Hydraulics, Inc. are John H. Makemson, President; Fred Dickerson, Vice President; and Charles Oehler, Secretary-Treasurer. Other executives of the corporation include J. M. Hoskinson, Sales Manager; John Albright, Chief Engineer; and Richard Corrigan, Advertising Manager.



KEEP DIESEL OPERATIONS OUT OF THE RED SHADOW OF DOWN TIME!

Rx
Prescription Filtration
FOR DIESEL
FUEL AND LUBE OILS
WIX offers many outstanding filtrants especially engineered to provide a Prescription type Cartridge for your individual operating conditions.
WIX has developed every filtrant for peak dirt retention—even microscopic particles are trapped—to give greater intervals between Cartridge replacements and higher filter efficiency during the longer life of every Cartridge.

Contamination in fuel and lubricating oils spells "down time" for repairs and frequent maintenance, unless this damaging dirt and sludge is kept out of your Diesel engines. You can always rely on WIX Engineered Filtration for a continuous flow of clean Diesel fuel and lube oils—WIX prescription type filtrants meet the toughest performance requirements of *every* engine operation! That's the reason WIX is in such wide use as original filtration equipment, as well as the first choice in countless places wherever Diesels are on the job.

Your engines can have this greater protection and longer service life at an amazingly low cost. Put WIX to work for you; keep your Diesels "out-of-the-red," and free from expensive down time!

wix®

OIL FILTERS AIR FILTERS

AUTOMOTIVE • INDUSTRIAL • RAILROAD

WIX CORPORATION • GASTONIA • N. C.

In Canada: Wix Accessories Corp. Ltd., Toronto

Gasoline Trucks Converted To Diesel

A fleet of Ford F-800 trucks on the gruelling construction material haul in the hilly country around Temple, Texas are zipping to new speed and load records through conversion by Stewart & Stevenson Services, Inc. to GM diesels. Two original equipment Ford engines were removed from the trucks of H. E. Williams, owner of the Little River Gravel Company and were replaced with Model 40450C General Motors diesel engines. Mr. Williams states that the new trucks definitely will pay for themselves through quicker trips and less down time.

The Ford F-800 trucks converted are 14-yard tandem axle cable dumps, having a gross weight loaded each of 56,000 lbs. One of the vehicles has run 40,000 miles; the other 27,000 miles, since conversion. No down time has been necessary since switching over to diesels.

How do the diesel engines stack up against the conventional Ford units?

MILEAGE

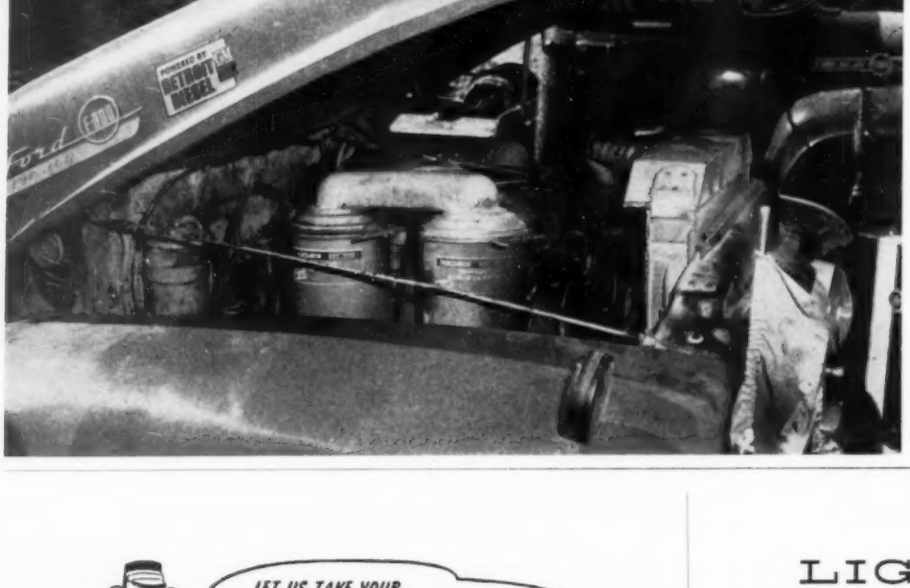
Gasoline or butane—3 to 3.5 miles per gallon.
Diesel—6.5 to 7 miles per gallon.

FUEL COSTS

Butane—17¢ a gallon.
Gasoline—24.5¢ a gallon.
Diesel—19¢ a gallon (tax included in all figures)

Thus, it can be seen that the trucks with diesel engines get twice as much mileage as gasoline or butane in spite of the fact that diesel fuel costs only two cents per gallon more than butane and 5.5¢ per gallon less than gasoline. The converted trucks haul sand, gravel and other road material from various plants in the Temple area to road construction sites. Mr. Williams said the upkeep of the F-800s before conversion was quite costly and down time was causing his company loss of precious time. The conversion of the trucks was handled without major problems, each conversion requiring less than a week. The conversion from gasoline engines to diesel required only minor modifications to the truck, such as extending the engine mounts five and one-half in., providing larger radiators and modifying fenders. Rear ends are 6:39 standard gear ratio.

Closeup of the GM diesel installation in a Ford truck. Note the Purolator twin dry type air filters.



Emergency Diesel-Generator Set Keeps Bank Operating

Forced by power failure to suspend vital operations, it took the Havana branch of the First National City Bank of New York less than five hours to order a diesel-generator set, get delivery, complete the installation, and put the equipment into

LET US TAKE YOUR
NOISE AND PULSATION PROBLEMS
OFF YOUR HANDS
It is our engineering specialty to
STOP PULSATION
—from surges created by compressors, pumps, blowers and pressure reduction systems.
STOP NOISE
—from intake or discharge of air, steam or gas from engines, compressors and vacuum systems.
WHAM
WHAM
WHAM
The Burgess-Manning Snubbing Principle, engineered to your specific problems, will provide noteworthy savings in operating and installation costs, increased production, reduced maintenance, improved public and employee relations and prevention of compensation claims.
We invite you to present your problems for recommendations.
BURGESS-MANNING COMPANY
Sound Engineering
747 East Park Avenue, Libertyville, Illinois
Dallas, Texas

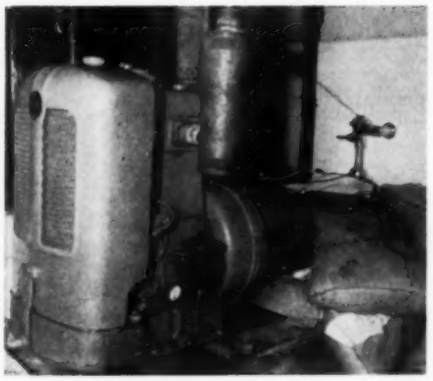
LIGHTWEIGHT CHAMPIONS

by America's largest manufacturer of AIR-COOLED DIESELS

MODEL KBA-605:
7.5 KW permanent magnet generator mounted to AC2 diesel engine. Wt.: 550 lbs.
MODEL AC2:
Air-cooled, two-cylinder, four-cycle, V-type 14 BHP @ 1800 RPM. Wt.: 350 lbs.
MODEL AC1:
Air-cooled, one-cylinder, four-cycle. 6.5 BHP @ 1800 RPM. Wt.: 220 lbs.

AMERICAN MARC Inc. is the acknowledged leader in the field of lightweight, air-cooled diesel prime movers for all uses requiring 6.5 to 15 BHP. Prominent in the American MARC line is the new permanent magnet generator, available from 3 to 7.5 KW output. (AC or DC, and industrial three-phase). American MARC also manufactures rotating armature generators, refrigeration power units and diesel pumping units of various capacities for industrial and marine installations.

AMERICAN MARC INC.
DIESEL ENGINES
1601 West Florence Ave.
Dept. D-28
Inglewood, California
Telephone OR 8-7174
6-104



service. A modern mechanized bank is virtually paralyzed when electricity is cut off. Not only do the lights go out but electric typewriters, adding machines, computers, bookkeeping machines and other equipment go dead. When power failed in Havana and officials announced that the interruption might be of long duration, Bank Manager W. C. Beaulieu promptly called the W. M. Anderson Trading Company, S. A., to order an emergency generating set. Anderson swiftly loaded up a 6 kw Model 45 Fairbanks-Morse diesel-generator and headed for the bank. The best place they could find to put the unit was in a men's room. Fortunately, the F-M unit was skid-mounted and did not require a special foundation. A few sand bags were put on the skids to steady the engine. Make-shift lines were strung to provide emergency lighting and to carry power to the most important machines. Less than five hours after the first phone call, the diesel was started up and the bank was back in business. The city's power interruption lasted a long 57 hours and the F-M diesel kept the bank operating. Mr. Beaulieu reported that the unit "worked perfectly and generated enough power to run our essential machines as well as to furnish emergency lights."

Branch Office Opened

R. D. Sutherland

Morgan Washburn

C. Lee Cook Company, Louisville, Ky., announced the opening of a Branch Office and Warehouse in Los Angeles on January 1, 1958. Robert D. Sutherland has been appointed Branch Manager. Morgan Washburn, who has been Cook's California agent since 1928 is retiring, although he will be available as a consultant for the company. Bob Sutherland is a graduate of Stanford University and spent several years with Ingersoll-Rand prior to 1942. After his discharge from the Navy, he was with the Worthington Corporation as a sales engineer and then joined the Ralph M. Parsons Company in charge of their mechanical equipment section. Cook's Los Angeles address will be the same as the Morgan Washburn Company—1341 South Hope Street, Los Angeles, California.

Jim Miller, Shepherd Machinery Co.'s General Service Manager, administrates one of the country's largest and most modern heavy equipment repair facilities.

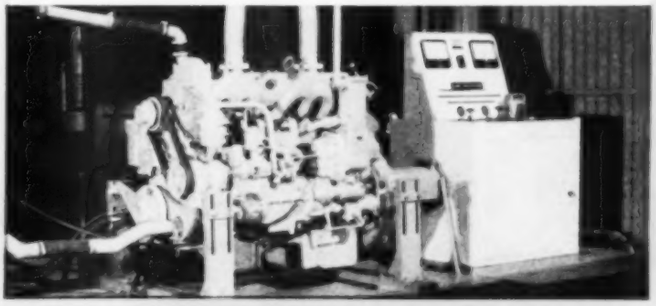
SHEPHERD MACHINERY SAYS:
"With our Clayton Dynamometer we deliver better engine performance... happier customer service— at greater profit!"

Keeping customers happy and coming back to the same place to do business is essential to Jim Miller, General Service Manager of the Shepherd Machinery Company, located in Los Angeles . . . one of the nation's largest dealers in construction machinery, industrial and marine engines.

"With our Clayton Engine Dynamometer—which we purchased in June 1953—we are certain that we're making available to our customers the highest possible standards of service, and at a profit to us.

"A Dynamometer offers many advantages," states Jim Miller, "but most important to us has been the ability to run-in and accurately test all rebuilt engines . . . This has practically eliminated costly warranty field service trips and, of course, vastly improved customer confidence in our workmanship . . . This alone means thousands of dollars a year to any engine distributor."

Let a Clayton representative show you how a Clayton Dynamometer will pay for itself out of savings alone.



FEATURES OF CLAYTON DYNAMOMETERS

- Designed and built for "running-in" rebuilt gasoline and diesel engines.
- Gives complete on the road or job performance data in terms of horsepower or torque and RPM.
- Torque loads are maintained indefinitely or changed at will to fully test any engine.
- Engine adjustments on the stand are simple to make.
- All models handle either right or left hand rotation.

Sirs: Please send us more information on the complete line of Clayton Dynamometers without any obligation to us.

NAME _____ COMPANY _____

ADDRESS _____ CITY _____ STATE _____

OUR BUSINESS IS _____ We handle _____ engine repair jobs a week.

Send to: Clayton MANUFACTURING COMPANY
443 NORTH TEMPLE CITY BLVD., EL MONTE, CALIFORNIA

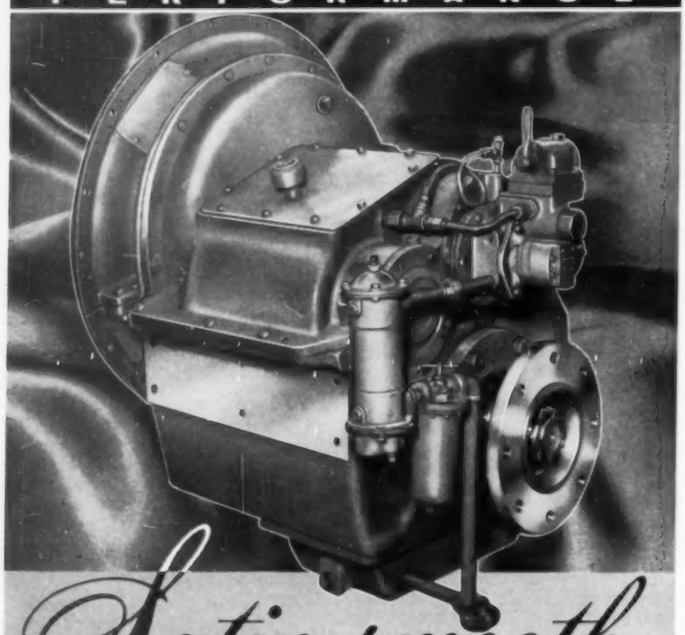
Mid-West Diesel News

By L. H. Houck

UNIVERSAL Bridge Co., Kansas City, Kan., put a new 405 Koehring crane with a 65 ft boom on their bridge job at Jefferson City, Mo. The new machine was delivered by Van Kappel, Kansas City and is powered with a 4-71 GM diesel. Supt. Caesar Broccard said the new engine uses 5 gallons of diesel fuel per shift as compared with 50 gallons of gasoline on a similar rig which the new one replaced.

WESTERN Machinery & Engine Co., St. Louis, has delivered a GM 6029C diesel to Norman Cox, Corso, Mo., for powering a rock crusher.

PERFORMANCE



Satin smooth

more RUGGED than a boom boat

Here is the perfect mate for the modern marine diesel . . . with every desirable feature to provide satin smooth power with utmost reliability. The S-N 3900 Series Hydraulic Gears, with responsive finger-tip control, transmit full load and speed either ahead or astern with no loss of power due to clutch drag. Simple compact design . . . extremely rugged construction . . . easiest to service . . . low price per horsepower . . . and widest choice of reduction gear ratios are but a few of the reasons why more operators specify S-N 3900 Series for new installations or repowering. For complete information see your S-N distributor or write direct. The Snow-Nabstedt Gear Corporation, Hamden, Connecticut.

SNOW-NABSTEDT

Transmission Engineers FOR OVER HALF A CENTURY

NICK BLACK, Greeneville, Tenn., has repowered a Ford C900 truck with a Cummins 175 hp JT-6-B diesel.

CAWOOD Produce Co., Springdale, Ark., now have a fleet of six diesels for hauling produce with several new units added this year. The fleet is Mack.

NEKOOSA Edwards Paper Co., Port Edwards, Wis., has repowered a GE locomotive with two 250 hp NT-6-B Cummins diesels delivered by Cummins Diesel of Wisconsin, Milwaukee.

GLEASON Equipment Co., Chicago, reports the sale of ten 45-ton P & H truck cranes in the Chicago area in the past six months; most popular power is the new P & H diesel.

CASEY & Emmert, Inc., 1424 W. Ohio St., Chicago, is handling the Oliver line with special emphasis on the Oliver OC-12 track-type tractor with the Oliver high-torque 53 hp diesel. They recently demonstrated it climbing a 70 per cent grade. A considerable number have been sold to contractors working in heavy construction. They have a fleet of radio dispatched service trucks to take care of field service.

ST. LOUIS Public Service Co., will air condition 100 more of its large diesel buses so that by next summer riders will find 240 big diesel buses air conditioned. GM diesels power the bus fleet.

A MACK Thermodyne diesel truck for Farmers Produce Co., Springdale, Ark., and a similar unit for the Rogers Oil Co., Rogers, Ark.

JONES & Laughlin Steel Co., Schley Mine, Gilbert, Minn., have installed new power in a Michigan 103-T-CD shovel; 175 hp JT-6-B Cummins diesels, a pair. Cummins Diesel Sales Corp., Hibbing, Minn., made the sale.

TERRA Construction Co., Great Bend, Kan., has contract for dirt moving at the Amarillo jet base and is using a fleet of International 75 Payscrapers with TD-24 pushers. Dirt moved exceeded 25,000 cu yd per two-shift day.

MIDWEST Industrial & Marine Co., has moved into a new plant at 835-37 N. Capitol Ave., Indianapolis. It specializes in diesel engine service and injector service and represents International industrial engines.

C. F. STUMPE Motor & Imp. Co., is a Missouri dealer at Washington for Case industrial equipment including the Terratrac crawler tractor with 100 hp diesel engine.

DOX-BLOCK Co., St. Paul, repowered a Mack B-71 truck with a Cummins NHB 220 hp diesel, from Cummins Diesel Sales, Inc., St. Paul, Minn.

CHARLES Friedn, Licking, Mo., has powered a new sawmill with a Cummins JF-6-P, 105 hp diesel which was supplied by Cummins Missouri Sales Corp., of St. Louis.

MASSMAN Construction Co., Kansas City, took delivery on a 6-71 GM diesel from Western Machinery & Engine Co., St. Louis, to repower the *MV Lou Simms*.

MIDWEST Koehring dealers report good business for the well-known Koehring in all capacities. Dealers are Allied Construction Equip. Co., St. Louis; Clarence L. Boyd Co., Oklahoma City and Tulsa; McDonald Equipment Co., Little Rock and the G. W. Van Keppel Co., Kansas City.

BARBOUR Metal Boat bought a GM 6-110 diesel to power a tow boat built for the Mary Construction Co. Delivery was made by Western Machinery & Engine Co., St. Louis.

DENVER–Colorado Springs–Pueblo Motorway, Denver, Colo., have installed a Cummins NHHB6 diesel in a Flxible bus. Delivery was made by Cummins Diesel Sales Corp., Denver.

V-Angle Compressor Bulletin

A new bulletin describes Cooper-Bessemer V-angle compressors Type GMXF. It describes parallel turbocharging of engine-driven compressors for service from 330 to 825 bhp for application on field gathering repressuring and refinery service. Bulletin No. 84 available upon request to The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

Fishing Boat Repowered

A new diesel engine has been installed in the scalloper *Barbara M.*, owned and operated by Captain Hillyer of New Bedford, Mass. This is a Lathrop DH-200, 6-cylinder, 4-cycle diesel marine engine of 260 hp, or 187 hp for continuous duty, at 1600 rpm, supplied by Burmeister & Wain American Corporation, Lathrop Engine Division of Mystic, Connecticut. The total weight of the engine is 5100 lbs. It has a 5¾ in. bore and a 6 in. stroke, with a displacement of 935 cu in. With a 3.88-1 reduction, the vessel on the trial run clocked 11.7 knots, turning a 48 in. x 36 in. propeller. A 4 kw generator is operated direct from the engine to provide the required electricity for the navigational instruments and lighting. The complete installation was made at the Norlantic Diesel Yard in New Bedford, Mass.

Inland River Reports

By A. D. Burroughs

THE continuing rush to the river banks by the industries of the nation gives the diesel industry room for expansion, too, in the New Year. Southern waterways indicate the most obvious growth of plants and resulting traffic, and Southland shipyards reveal this reflection in their increased activities.

A PAIR of Fairbanks-Morse engines supply the rated 1000 hp for the recently christened 80 ft towboat, the *Sipsey*. The modern Texas-built craft built by Bludworth Shipyard for the Alabama firm, Alacoal Barge Corp., serves as a new pusher for the coal and iron ore traffic.

BRYANT Boats, Inc., (La.) completed the new 56 x 18 ft towboat, the *Stella G*, for owner Norman C. Gautier. The craft is equipped with symmetrically matched twin GM 6-110's for profitable power.

ADDITIONAL Louisiana production includes the new 80 x 22 ft hawser type tug-towboat, *Bayou Teche*, built by St. Mary Iron Works, for Thibodeaux Towing Company. The push-pull power comes from two turbocharged Caterpillar engines, operating through Snow-Nabstedt gears at 3 to 1 reduction.

AT Greenville, Miss., the pride of the Greenville Towing Co. is the new fleet addition, *Walter Williamson*, reported in action all along the waterways with the 2400 hp from a pair of GM (Cleveland) model 12-278A engines.

CUMMINS Diesel Sales Corp., Memphis, Tenn., reports supplying the pair of VT-12-M engines for the *Frank E. Woods* towboat at Claredon, Arkansas.

GEMACO, Inc., Pascagoula, Miss., took delivery of two Cummins engines model NRTO-6-M to supply the 335 hp for the craft, the *Skippy Walker*. The sale was made by Cummins Sales & Service, Ft. Worth, Texas.

IT'S Allis-Chalmers all the way for the new 50 ft towboat, the *Arizona*, built by Grafton (Ill.) Boat Works for service with the George Mason Towing Service, Smithland, Ky. The neat pusher has a pair of Buda engines, Model 6 DAMR-779 rated at 162 hp, plus a Buda generator set, Model 2BDMG-77.

THE NEW tug, *James J. Versluis*, built by Sturgeon-Bay Shipbuilding for the Water Fund of the City of Chicago will use the 800 hp developed from the Enterprise engine for duty as a boat of all trades; crewboat, fireboat, ice-breaker, harbor inspection boat, and salvage craft. The 83 x 22 ft craft carries quality equipment with renowned names; Caterpillar generator sets, Gardner-Denver air-compressors, Westinghouse air brakes, and many more familiar names.

THE City of Milwaukee, Harbor Division, Wisconsin, became the owners of two 220 hp Cummins engines to provide the power for their *Burger Boat*. The engines were purchased from Cummins Diesel of Wisconsin, Inc., in Milwaukee.

GM ENGINES from the George Engine Company, Harvey, La., will power the 600 hp towboat ordered by Hutton Marine Service, Baton Rouge. Construction for the 50 x 18 ft craft will be done at the Yaun Manufacturing Co.

AT HOME port, the *Cornell* was downbound on the Ohio with a mixed tow of tar, steel, and several empties. Owned by Union Barge Line, this 1945 Dravo production, 176 x 36 ft, handles the 2800 hp from Superior engines.

THE 2160 hp *City of Huntington* was seen busy on the Ohio River at work for the Ohio River Co. fleet. The near-new towboat is equipped with twin Baldwin-Lima-Hamilton engines.

MISSOURI Barge Line Company's current construction project is the new 1800 hp towboat at the Cape Girardeau yards. The craft is to measure 153 ft with power to be supplied from twin GM (Cleveland) engines Model 12-567, and will be similar to the *E. E. Smith*.

IN ANSWER to a recent letter, the *Arrowhead* was built by St. Louis Shipbuilding and Steel Corp., in the early part of 1956 for Midwest Towing Co. The towboat measures 150 ft in length, and is equipped with a pair of Cooper-Bessemer JS-8 turbocharged and aftercooled 4-cycle engines, each rated at 1200 hp.

THE Brent Towing-Contracting Co., (Miss.) is giving the new towboat, *Hoss T* the finishing touches. Power for the 50 x 16 ft craft will be delivered from two Model 6-71 GM engines, rated at 165 hp each.

A SPECIAL thanks for the greeting with the photo enclosed from a Pittsburgh reader. The photo was of the craft we haven't seen, the refueling tanker, *Sinclair-Gary*, with a good view of the engine room showing the three Cooper-Bessemer engines.

Steam Tug Converted to Diesel

The ex-steam tug *Green Bay* is now in the process of being converted to diesel drive at the yards of Manitowoc Shipbuilding Company for the C. Reiss Coal Company of Sheboygan, Wisconsin. The *Green Bay* is a harbor tug used extensively for maneuvering Reiss steamships in and out of harbors on Lake Michigan and is also used for breaking ice in the wintertime in the Manitowoc Harbor, particularly in the shipyard area.

This tug is being repowered by a direct drive, direct reversing Kahlenberg Model E diesel, rated 700 hp at 350 rpm. Kahlenberg is furnishing a package installation of propeller, shafting, couplings, main engine and its accessories, and pilot house control with two control head stations for wheelhouse control. Auxiliary generator sets will be Kohler 35 kw, 120/208v ac sets powered with Hercules diesels.

Shown above is the engine room of the 135 ft. *Sea Service*, one of six large supply ships in the Sea Service, Inc. fleet. Operating among offshore rigs in Gulf Coast waters, the *Sea Service* is powered by two 516 HP Allis-Chalmers Diesels. To help assure a steady flow of vital power, these engines are protected by Nugent Full Flow Lube Oil Filters which filter *all* the lube oil in circulation *every cycle* and remove all foreign solids as small as 2 microns.

Your valuable engines and compressors deserve this kind of protection, too—they get it when you specify Nugent Full Flow Filters—and they pay off with longer trouble-free engine life.

Write for free descriptive literature, today.

Nugent Fig. 1555-4L Full Flow Filter and Fig. 1555E-4L laminated granulated disc type cartridge.

ESTABLISHED 1897

REPRESENTATIVES IN PRINCIPAL CITIES

WM. W. NUGENT & CO., INC.
3441 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

Assistant General Sales Manager

Horace G. Trainer

The appointment of Horace G. Trainer to the newly created position of Assistant General Sales Manager of the Cleveland Diesel Engine Division of General Motors has been announced by K. O. Keel, General Sales Manager of the Division. Horace Trainer was born in Berwyn, Pa. where he attended elementary and high schools. In 1921 he was appointed to the United States Naval Academy and graduated with a rank of Ensign in 1925. Trainer retired from the Navy in 1934. This same year he completed a post graduate course in Mechanical Engineering at the University of California and received a Master of Science degree. Trainer joined Cleveland Diesel Engine Division of General Motors in October 1934, and from 1935 until 1953 he was this Division's service representative for submarines at Portsmouth, New Hampshire and New London, Conn. He returned to Cleveland in that year and was Sales Application Engineer until he was named Executive Engineer in January 1957. He has held this position until his most recent appointment of Assistant General Sales Manager.

Engine Indicator Analyzer

All internal combustion engine pressures, vibrations and ignition voltages can now be measured directly with the new SLM Engine Indicator-Analyzer, Series EA-114. Introduced by the Kistler Instrument Corp., North Tonawanda, New York, this combined electronic pressure indicator and engine analyzer utilizes the electrostatic principle to make precision dynamic measurements. A Swiss-made quartz crystal Pressure Gage (pickup) offered exclusively by Kistler, is the heart of the system. When used with various accessories and adaptors, it provides visual display of vital engine functions on a standard oscilloscope screen. Cylinder, manifold, fuel injection and detonation pressures, combustion pressure rates, engine vibrations and crankshaft torsional vibration can be alternately shown and precisely measured. This transducer system is used also to adjust timing, and check peak cylinder pressures, load distribution, valve operation, pre-ignition and knock.

Components are simple, rugged and well suited for shop and field applications. When used to measure cylinder pressures, the SLM Pressure Gage is mounted in a modified spark plug, a special indicator port, or in place of the fuel injector. It will withstand combustion gas temperatures up to 3200°F without special air or water cooling.

The selector switch permits the choice of the signal from any one of sixteen pressure gages or vibration pickups. As many as four signals can be superimposed on the screen, making possible, for example, the simultaneous display of peak pressures in four cylinders for load balancing adjustment. Pressure and vibration patterns for normal operations are generally measured, photographed and used as samples. Subsequent deviations caused by faulty operation can be easily detected. As a maintenance instrument, the SLM Indicator can be used to monitor diesel and gas engines in power plants, pipeline stations, marine installations, etc. For testing, adjusting or diagnosing engine troubles, it is useful for automotive engine plants, service training schools and service stations. The basic equipment is already in extensive use for engineering-tests of new engines by manufacturers.

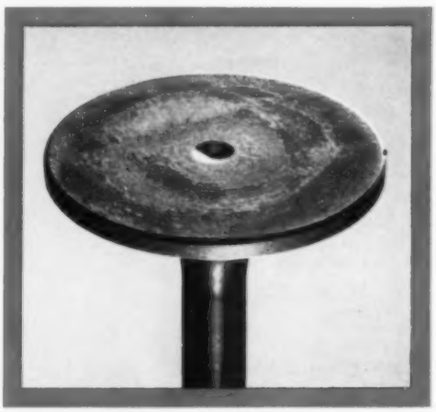
Available in three models, Marine-Industrial, Automotive and Laboratory, the Kistler SLM Engine Indicator includes an amplifier-calibrator, oscilloscope and selector switch all housed in a compact, portable case, plus several high precision pressure gages, pickups and connecting cables. As requirements increase, this equipment can be expanded to include adaptors and accessories most suitable for a particular application. Detailed information can be obtained by requesting Bulletin EA-114 from Kistler Instrument Corp., 15 Webster St., North Tonawanda, New York. (ITS NEW)

Accelerated Engine Test Comparison Proves

EATON SUPER-ALLOY VALVES LAST MANY TIMES AS LONG

AS VALVES MADE FROM COMMONLY USED ALLOYS

COMMONLY USED ALLOY
Failed at Less than 600 Hours

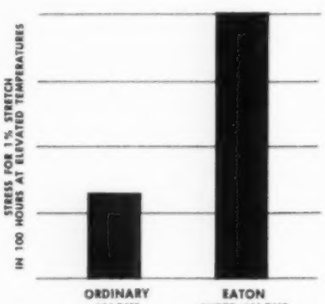


EATON SUPER-ALLOY
in Excellent Condition after 3000 Hours

To meet the requirements of extreme heavy duty service, Eaton has developed unique production methods for the making of exhaust valves of super-alloys possessing exceptionally high hot-strength and corrosion resistant properties. These Eaton Super-Alloy Valves are "custom tailored" to meet the specific requirements of the engines for which they are designed.

As a pioneer in the development of valve designs and materials which have added thousands of miles to valve life expectancy, Eaton has made such important contributions as sodium cooled valves, seat-faces of high-alloy materials, aluminized valves, and now super-alloy valves.

If you build engines—either gasoline or diesel—for heavy duty applications such as motor trucks, buses, earth moving machinery —it will pay you to discuss the advantages of Eaton Super-Alloy Valves with our engineers.



The results of laboratory tests represented by the above graph indicate the superior hot-strength of Eaton Super-Alloys over commonly used exhaust valve materials.

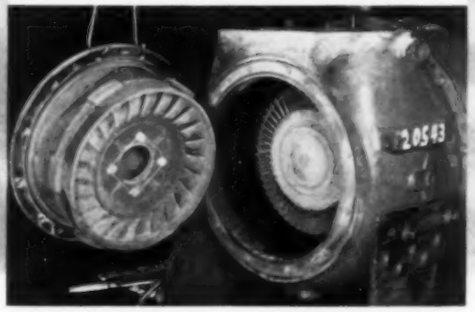
EATON VALVE DIVISION MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

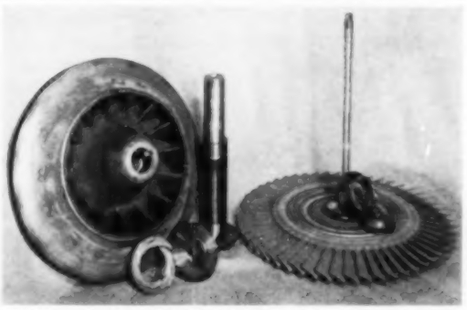
after 35,000 hours of service... this ELLIOTT turbocharger is still in good running condition

(It operated continuously—24 hours a day—for four years)

Inspection (of the blower end) by turbocharger engineer reveals remarkable condition even after four years service.



A view of the turbine end of the Elliott turbocharger shows only slight erosion on the turbine blades and nozzle ring.



After complete disassembly, inspection of the rotors revealed little or no evidence of wear on the journals, thrust faces, and bearings.

M7-2

dependable operation with ELLIOTT turbochargers!

for two-cycle and four-cycle diesel engines
175 hp and up

Here's what happens to Elliott-engineered turbochargers under continuous 'round-the-clock operation. Serving gas-engine compressors in a midwestern pipeline compressor station, this turbocharger was originally installed four years ago. When shut down and returned to the Elliott plant for inspection, it was found to be in good running condition after *35,000 hours of service.* This outstanding record of dependable service is further proof of Elliott's superior design and workmanship. That's why it pays to specify Elliott for all turbocharger requirements.

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Turbocharger Department
JEANNETTE, PENNSYLVANIA

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Adaptable to any engine of your choice having SAE Bell Housing!

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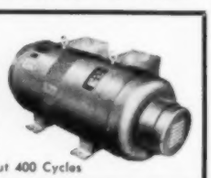

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BUILDERS OF FINE ROTATING ELECTRICAL MACHINERY SINCE 1928

KATO Engineering Company 1443 First Ave. Mankato, Minnesota

West Coast News

By James Joseph

TO Weigart Brothers, Ocean Park, Wash., a 2 cylinder, 32 hp, model 45C4-1⅛-2 diesel unit from Fairbanks-Morse.

SOLD to Arizona's Butane Corporation, two Cummins NH-6-B engines to power Mack LT trucks, replacing gasoline engines. Sale by Cummins Arizona Diesel.

NINE GM diesels (seven 6-110s and two 3-71s) power Humble Oil & Refining Co.'s offshore barge *Humble SM-1*, core-drilling off Pacific coast for tidelands oil.

TWO manufacturers—Rootes and Perkins—may adapt their engines to muskeg Scout Track vehicles, designed and produced by Calgary, Alberta's Bruce Nodwell Ltd. U.S. oil companies are testing the new muskeg rigs.

TO C. NORMAN Peterson, Berkeley, Calif., a Fairbanks-Morse 60 hp Model 49 storm water diesel-driven pump.

DELIVERED by Cummins Rio Grande Sales & Service, Albuquerque, N. Mex., to Twining Ski Corp., Taos, a Cummins Model HRC 4P power unit.

AMONG first natural gas fuel applications of vapor phase cooling is installation on a couple of natural-gas burning Worthington SCCG-8 engines at new Southern California and Southern Counties Gas Companies' Needles compressor station.

TO HAWAIIAN Dredging Co., Ltd., San Francisco, a 6 cylinder 150 hp Fairbanks-Morse generator set.

FOR Aerojet-General Corp., Sacramento, Calif., a Fairbanks-Morse 2 cylinder, 60 hp diesel engine.

ANOTHER Fairbanks-Morse Model 49, 40 hp diesel engine has gone to Crescent City, Calif's Shanley Construction Co.

POWERING a Mack LTL SW truck: a Cummins NT diesel engine, the rig operated by Bardahl of So. California, Los Angeles.

TO POST Transportation Co., Los Angeles, a Cummins NH diesel to power a Kenworth BC 825C truck. Sale by Cummins Service & Sales, Los Angeles.

TO SALEM, Oregon's Electric Corporation, a 32 hp Model 45 Fairbanks-Morse diesel generator set.

IN THE works: one of first major west coast marine installations of Mercedez-Benz diesels on yacht being built by Wilmington Boat Works, Wilmington, Calif.

TO JAMES Cowan, San Diego, a 5¼ hp model 45B3⅛ diesel engine from Fairbanks-Morse.

TWO Fairbanks-Morse 3 kw model 45-B3⅛ diesel generator sets have gone to P. S. Pell & Co., Ltd., Honolulu, T.H.

TO EVANS Engine Co., Seattle: two new 13AKP Torcon converters from Portland's Hamilton Engine Sales, Inc.

COMMERCIAL Marine Construction Co., Seattle, has powered a new fishing vessel with a GM-4-51 engine.

Diesels For Warsak Dam

The latest repeat order for Rolls-Royce diesel engines for the $65-million Warsak power and irrigation dam in Pakistan, part of Canada's contribution to the Colombo Plan, left Rolls-Royce of Canada's Montreal plant recently. The seven normally-aspirated six cylinder engines, developing 200 bhp at 2100 rpm, are being installed in White Motors dumpers. They will bring the total value of the order for engines and spare parts dispatched to date to more than $350,000, and will supplement the 62 Rolls-Royce units already in service on the project in trucks, rear dumpers, generating sets, mobile cranes, concrete mixers, and carriers. Rolls-Royce diesels are specified on the Warsak project for all rubber tired and stationary units.

The general contractors, Angus Robertson Limited, of Montreal, are able to carry a reduced stock of spares, as almost all parts subject to wear are interchangeable within the Rolls-Royce diesel engine range.

Electronics-Controls Division Created

The formation of a new Electronics-Controls Division is announced by Ralph L. Boyer, Vice-President and Director of Engineering for The Cooper-Bessemer Corporation, Mount Vernon, Ohio. The anticipated trend to automation of power and compressing operations by pipeline, petrochemical and industrial plants has initiated the Company's decision to create this new division, Mr. Boyer explains. Within the next 10 years, for example, it is expected that the major gas transmission pipelines in the United States will be automated. Cooper-Bessemer has been engineering satellite semi and fully automated systems for the past several years. By the use of the automated systems, it has now become practical to start up engine-driven or electric motor-driven compressors, load the compressors onto the pipeline, regulate

compressor capacity within precise limits, cut the compressor out of the pipeline and ultimately shut down the entire unit. Some of the newest automated systems utilizing Cooper-Bessemer compressors provide for remote control regulation of an entire compressor station without attendants of any kind by microwave signals from distant control centers.

One principal advantage of automatic control is the simple ability to operate both engine and compressor equipment at peak efficiency. Since response of automatic controls to changing load condition is almost instantaneous, maximum economy in fuel and operating cost is more easily attained. With costs uppermost in the minds of compressor and engine operators, both today and in years to come, every ultimate operating benefit through automatic controls will be demanded by gas transmission, power generation and processing industries. Mr. Boyer announced the new Electronics-Controls Division will be headed by Mr. Reed D. Hamilton.

New Truck For Mines

A new truck for mines, carrying loads of 2½ tons, has been developed. The Getman KD-2 truck, is built by Getman Brothers of South Haven, Michigan, the manufacturers of the Getman Scoot-Crete. The new truck makes it possible for one man to load, drive and dump. It is designed for mines, particularly for ore carrying, and has the following dimensions: overall length, 122 in., overall width, 60 in., box height at tail gate, 47 in., turning radius, 96 in., turning clearance in the clear, 20 ft overall, wheel base 83 in., box capacity, 40 cu ft, carrying capacity, 2½ tons. The Getman KD-2 truck is powered by a two cylinder 20 hp air-cooled Deutz diesel, imported from Kloeckner-Humboldt-Deutz A.G., Cologne, West Germany. The unit has four speeds forward and four speeds reverse, making it good for operation in narrow passageways where equal speeds in either direction are desirable. The Getman KD-2 truck weighs about 3500 lbs and sells for $3450.00 F.O.B. factory, South Haven, Michigan.

American MARC Sales

Sales of American MARC Inc., developer and manufacturer of diesel engines and generators, for the first quarter of the current fiscal year increased more than 34 per cent over sales for the entire past fiscal year, President W. Denis Kendall said recently in the company's first annual report which also included the current fiscal year's first quarter results. For the three months ended August 30, 1957, the first quarter of the company's current fiscal year, sales totalled $364,260 which resulted in a net profit of $8,798. In releasing his report, Mr. Kendall stated that profits for the second quarter are expected to substantially exceed those of the first three months. For the fiscal year ended May 31, 1957, sales totalled $287,973. "During that period," Mr. Kendall said, "the company devoted almost its entire effort towards research and development of small light weight diesel engines and new and conventional generators. Such emphasis placed on research and development resulted in a net loss of $354,689 for the past fiscal year, however the company was successful in its efforts. With the start of the current fiscal year production reached levels permitting profitable operations. This marked the changeover of the company from that of substantially a research and development organization to that of a manufacturer and producer," he said.

The company's current backlog is approximately $1,950,000 reflecting the recent receipt of orders totalling $250,000. The company's backlog on May 31 last was $340,000. Common stock outstanding as of August 31, 1957 totalled 2,228,216 shares. At the close of the first quarter of the current fiscal year the company had distributors in 16 states. Additional distributors are being granted to secure comprehensive national distribution. There were four distributors or representatives in four foreign countries.

A new division, the Electro-Dynamics Division, was established during the past fiscal year for the development and manufacture of new and conventional type generators to provide generators for American MARC and furnish a new source of generators for other engine builders. This division occupies some 12,000 sq ft of the company's 50,000 sq ft manufacturing plant. Looking to the year ahead, Mr. Kendall said the company anticipates a strong sales development as its products are introduced in a variety of industries. In addition, the company expects to develop new applications for its products, among them, a 7½ hp air-cooled diesel outboard motor. An increase in contracts from national defense agencies is also anticipated, Mr. Kendall said, as the company's initial defense contracts are filled.

Fuel Oil Additive

Sudbury Laboratory, Sudbury, Mass. has announced a new fuel oil additive especially developed to increase operational efficiency of Diesel and Bunker C fuel oils. The new formula has been fortified with a special concentrate developed in the research laboratories of the Dupont Company which has been tested in over 200 million gallons of fuel and found to prevent formation of varnishes or gums, reduce sludge formation, and keep piston ring grooves clean. According to H. J. Atkinson, Director of Sudbury Laboratory, "After exhaustive search and tests we now feel that we have an additive that will free sticky valves, eliminate sludge, keep filters, injectors and nozzles clean and clears up smoky, fuel-wasting exhausts. Because Kleen-Kombustion keeps the whole power plant working at top efficiency, power output is increased and fuel costs reduced as much as 20%. It will definitely improve atomization and eliminate incompatibility of fuel oils. Heavy #5, #6, and Bunker C fuels retain much of the unrefined impurities in crude oil, and insoluble residues often combine with moisture and fuel to form sludge. Kleen-Kombustion has the ability to prevent agglomeration and keep residual particles dispersed through the fuel oil so that they will pass through fine orifices or screen openings without clogging."

Sudbury Kleen-Kombustion Additive is supplied in quart cans, sufficient to treat 250 gallons of fuel; in gallon cans, sufficient to treat 1000 gallons. Also available in 55-gallon drums. ITS NEW

Truck Diesel Brochure

A new line of diesel engines for trucks of 26,000 lbs gross vehicle weight and up are described in a six-page illustrated brochure recently released by the Detroit Diesel Engine Division of General Motors. Covered are the Division's new 71-E and Turbopower engines designed to provide extra low-cost mileage for all types of highway hauling units. Copies of the brochure may be obtained from Detroit Diesel distributors and dealers or by writing Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan.

Ultra Modern
High Output
Less Weight Per HP
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Low Fuel Consumption
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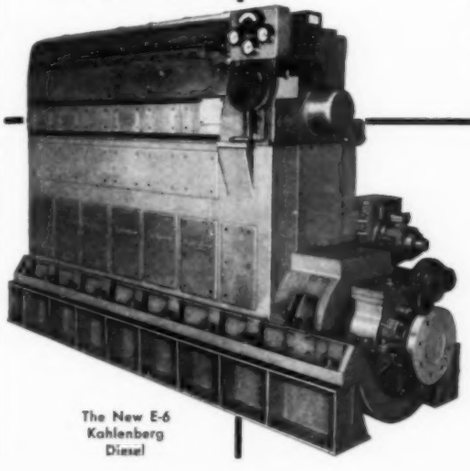

The New E-6 Kahlenberg Diesel

The Model E Series Kahlenberg Diesels are high output, heavy duty, low speed engines employing the pulse system of exhaust turbocharging in a two stroke cycle, uniflow scavenging, ultra modern design utilizing welded steel frame construction with short overall length, compactness, and full length base for easy installation.

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A naval architect writes . . . "I consider this Catalog one of the outstanding books of its kind published in this country. It is kept in our drafting room, and in writing specifications or looking up materials to be incorporated in my design of tugs, fireboats, and other floating equipment, the drafting room always uses it as a reference book."

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Volume Twenty-Two

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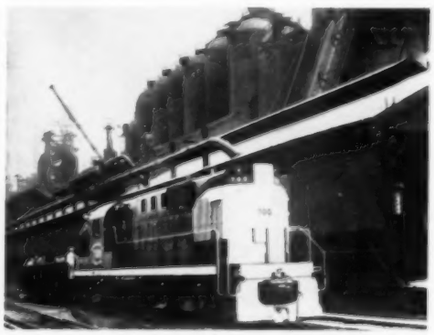
Logging Trucks Purchased

Union Lumber Company of Fort Bragg, California, has purchased three Kenworth Model 849 logging units, according to Lewis T. Gerlach, general sales manager of Kenworth Motor Truck Company, Seattle, Washington. The new Kenworth loggers are powered by 335 hp turbocharged Cummins diesel engines. Front axles have an 18,000 lb capacity and the dual rear axles have an 80,000 lb rated capacity and are double reduction type with interaxle differential. Rear axles incorporate Kenworth's heavy-duty springs and split-trunnion cast frame brackets. Main transmissions are five-speed constant mesh and auxiliary transmissions are four-speed. Union Lumber Company's newest logging units for private road operation have Kenworth's variable-section frame construction of heat-treated chrome manganese alloy steel. Maximum depth of the frames measures 16¾ in. Founded in 1885 as the Fort Bragg Redwood Company, the firm was reorganized by Founder C. R. Johnson in 1891 as Union Lumber Company. Presently, Union Lumber Company has more than 150 miles of main-line truck roads, more than 100 miles of secondary truck roads and more than 150 miles of fire roads. Logging production is largely transported over the firm's own network of private roads and approximately 60 per cent is moved in the firm's own Kenworths. Balance is hauled by trucking contractors. The newest Kenworth Model 849 loggers were delivered to Union Lumber Company by the San Francisco office of J. T. Jenkins Company, Kenworth distributors.

Locomotive Demonstrated



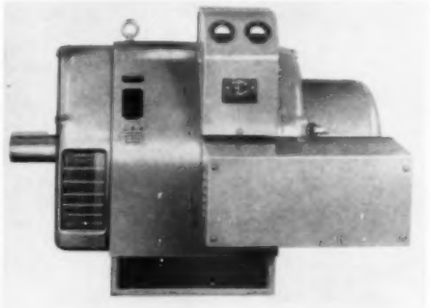
There's a new look to transfer operations of the Monongahela Connecting Railroad—an Alco 1800 hp all-purpose locomotive used by the line in serving its parent company, the Jones & Laughlin Steel Corp. The railroad, which handles transfer work at the sprawling Pittsburgh Works of J & L, demonstrated its new Alco DL-701 August 8 for members of the line's board of directors and ex-

ecutives of Pittsburgh financial houses. The locomotive was delivered to the MonCon from the Schenectady plant of Alco Products, Inc. several days before the working demonstration. Executives invited to inspect the new locomotive, which is powered by Alco's 12-cylinder Model 251 diesel engine, rode in a special gondola equipped with benches and a hand rail. Included in the demonstration was the haul of 1,865 trailing tons over a 1.86 per cent grade and a tight curve. The latter run involved the MonCon's *Low Boy*–20 cars of ore settings which were moved from the south side of the Monongahela River to the J & L blast furnaces in the north-side plant area. In making its run for the river bridge, the locomotive negotiated the 1.86 per cent trestle grade and wheeled around the tight curve just short of the bridge.

Towboat *Stella G.*

A new 56 ft x 18 ft x 7 ft towboat has recently been powered and sold by George Engine Co., Inc. of Harvey, La. to Norman C. Gautier of Harvey. This vessel is now operating in the Gulf Coastal Area. The 47 net ton pushboat was constructed at Bayou LaBatre, Alabama, by Bryant Boats, Inc., for George Engine Co.; and was outfitted with a symetrically matched pair of General Motors diesel engines, Series 6110, Model 62206. Electric power is furnished by two ACK-20 kw generator sets. The boat has been named the *Stella-G*, by her new owners.

Generator Starts up to 40% More Horsepower



Electric Machinery Mfg. Company has developed a unique, new generator. The machine features a static exciter and a voltage regulator with no moving parts. The regulator is of the magnetic amplifier type. The extremely fast voltage regulating ability of this type of regulator permits the generator to start larger motors. For example, a generator of conventional construction rated at 50 kw, 1200 rpm would start a 10 hp motor with full voltage starting and an allowable 25% voltage dip during starting. The new E-M generator (50 kw, 1200 rpm) under the same starting condition will start a 15 hp motor. The generators, trademarked *Amp-Pak*, are available in ratings from 50 to 150 kw. For more information write Electric Machinery Mfg. Co., Minneapolis 13, Minn.

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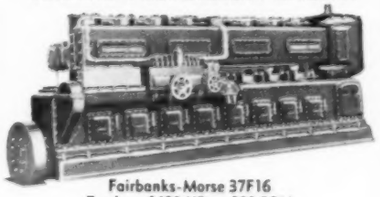

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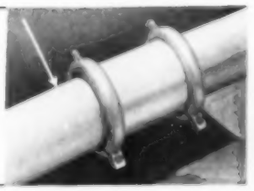

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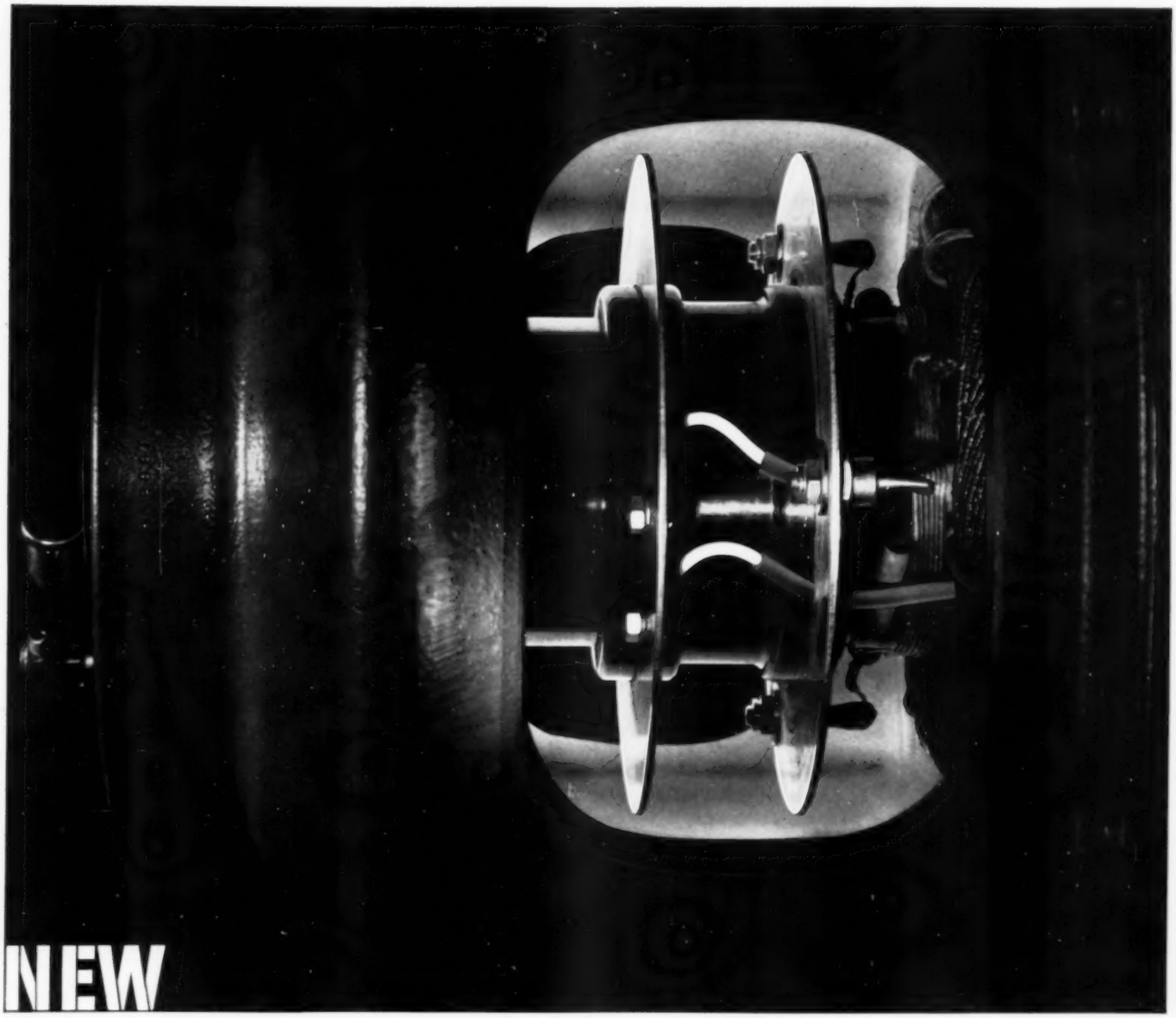

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When Delco designed the Safe-T-Generator to eliminate all spark-producing components, they not only made a safer unit, but one requiring far less maintenance.

Use of an AC exciter and Silicon rectifiers in place of the conventional exciter with its DC commutator, slip rings and brushes eliminates direct contact of moving parts—means less wear, less replacement of parts and less downtime.

While Delco continues to make the conventional generator, the Safe-T-Generator fills an important need in such applications as railroad equipment, off-shore oil rigs, shipboard uses, abrasive dust areas and troublesome weather conditions. Get all the facts on this new generator from your Delco Products Sales Office Representative—it can mean longer, trouble-free life in your operation.

Wherever power is required from 10 kw to 300 kw, there is a Delco generator to meet the need.

GM GENERAL MOTORS DELCO

DELCO MOTORS

Delco Products, Division of General Motors, Dayton, Ohio

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- GENERATORS
- ACTUATORS
- AUTOMOTIVE AND HYDRAULIC EQUIPMENT
- HERMETIC MOTORS AND CONTROLS
- RESIDENTIAL GARAGE DOOR OPERATORS
- AIR SUSPENSION COMPONENTS

GM

This Cooper-Bessemer-powered Marion 7400 walking dragline, owned by the Ohio River Collieries Company, is shown stripping overburden from coal deposits near Cheshire, Ohio. The diesel engine is an 8-cylinder Cooper-Bessemer JS, rated 750 hp.

Another example of efficient power at lower cost

Every month . . . *this* COOPER-BESSEMER POWERED DRAGLINE *strips 350,000 yards of overburden*

• The Ohio River Collieries Company, operating near Cheshire, Ohio, is now producing 40,000 tons of coal every month. And topping the list of important equipment is a Marion 7400 walking dragline powered by a 750 hp Cooper-Bessemer JS diesel engine.

At work 24 hours a day, 7 days a week, this Cooper-Bessemer powered dragline must strip 35 feet of sandstone and 10 feet of slate to reach valuable coal deposits.

It takes a heavy-duty power plant, with lots of flexibility and stamina, to stand up under conditions like these. Here, to list only a few, are reasons why such a schedule is more routine to a Cooper-Bessemer. There's advanced metallurgy for high strength construction, oversized crankshaft, extra bearing area, precision honed cylinders, tin-plated pistons and unique piston cooling.

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